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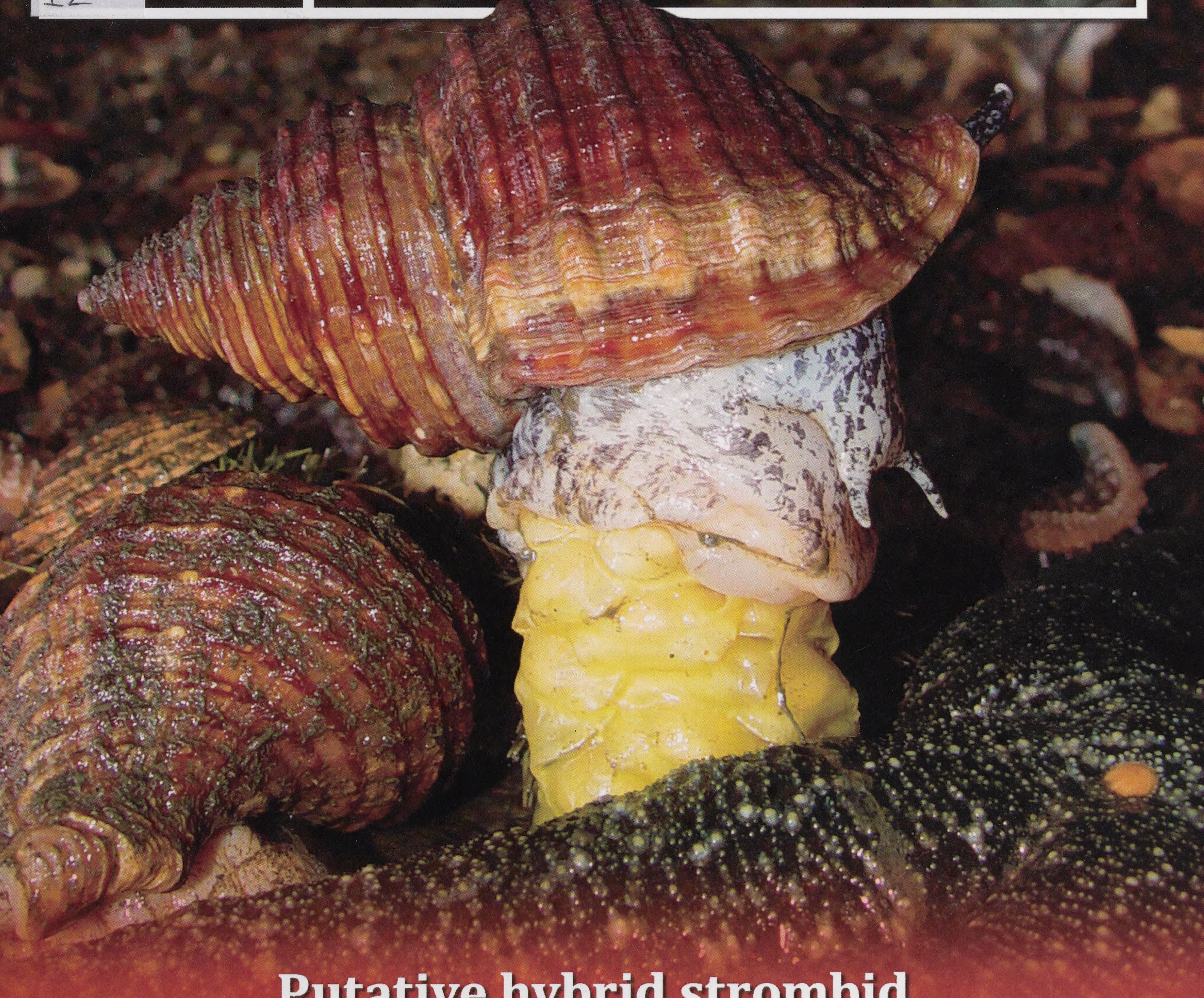

Putative hybrid strombid

New *Marginella* from South Africa

Sundaland relict cone

New deep-sea whelks

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FRONT COVER:

Neptunea lyrata (Gmelin, 1791) on egg mass in Petersburg, Alaska. (Photo courtesy of Roger Clark) (Cover artistic credit: Rex Stilwill).

MISSION STATEMENT

The San Diego Shell Club was founded in 1961 as a non-profit organization for educational and scientific purposes. More particularly to enjoy, study and promote the conservation of Mollusca and associated marine life through lectures, club meetings and field trips. Our membership is diverse and includes beginning collectors, scientists, divers, underwater photographers and dealers.

THE FESTIVUS is the official quarterly publication of the San Diego Shell Club, Inc. and is issued as part of membership dues in February, May, August and November. *The Festivus* publishes articles that are peer reviewed by our volunteer Scientific Peer Review Board, as well as articles of general interest to malacologists, conchologists, and shell collectors of every level. Members of the Peer Review Board are selected to review individual articles based upon their chosen field of expertise and preference. Available by request or on our website are:

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Editor's Note: *The Festivus* is accepting articles for future issues. Articles of a scientific nature may be submitted for the peer reviewed portion of our journal. Please refer to our Guidelines for Authors, and/or Guidelines for the Description of New Taxa in *The Festivus*, both available on our website: http://www.sandiegoshellclub.com/festivus/.

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A putative inter-generic hybrid between *Harpago* Mörch, 1852 and *Solidistrombus* Dekkers, 2008 (Gastropoda: Neostromboidae; Strombidae) from Đảo Phú Quý Vietnam

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ABSTRACT This paper presents a new putative inter-generic *Harpago chiragra* x *Solidistrombus latissimus* hybrid from Đảo Phú Quý, Vietnam. Hybridisation is not uncommon with the Strombidae, with 12 inter-generic and 11 infra-generic hybrids known in the literature. Understanding the rates and extent of hybridisation within an organism complex facilitates a greater understanding of the potential for hybrid derived speciation in that complex.

KEYWORDS Đảo Phú Quý, *Harpago*, hybridisation, *Solidistrombus*, speciation, Vietnam.

INTRODUCTION

Hybridisation is a pathway to speciation and is known to occur between genetically and morphologically divergent groups (Hamilton and Johnson 2015). In organisms where there are multiple opportunities for hybridisation, such as secondary contact or sympatry, and evidence for high rates of hybridisation, introgression and fixation of traits is not to be unexpected (Parker *et al.* 2020). The introgression of characteristics into a complex may not indicate that divergence between two parental populations is occurring, but rather may signal the decline of one species through merging of species complexes (van Wky *et al.* 2019; Matute *et al.* 2020). Similarly, a hybridisation event may represent a random mating event with no fecundity in offspring resulting in no consequences for either parental stock.

Hybridisation may also lead to taxonomic errors in species recognition based on morphology (Costa *et al.* 2019). This has two implications. First, the recognition of hybridisation in species which are very similar morphologically where the hybridisation even leads to an organism with negligible morphological variation form the parental stock (Slager *et al.* 2020). Second, implications for deciphering the taxonomy of highly morphologically variable species complexes where phenotypical states for both parental species are discordant (Schweizer *et al.* 2019). The recognition of a species arising from the consequences of hybridisation needs evidence of morphological constancy and for that morphological form to be present through time (Maxwell *et al.* 2019).

The hybridisation of sympatric taxa is not uncommon and may occur in between localised populations being absent in a broader shared range (Natacha *et al.* 2020). This localised hybridisation is seen as a pathway towards genetic diversification through ongoing introgression and may lead to genetic diversification that may lead to the recognition of cryptic subspecies (Maxwell and Dekkers 2019; Everson *et al.* 2020; Maxwell *et al.* 2021).

In the family Strombidae, hybridisation is an ongoing process occurring between species at both the inter-generic and infra-generic level (for a synopsis of hybridisation in Strombidae, see Maxwell *et al.* 1999). This indicates that there is a level of tension in stromboidian species demarcation with a low degree of reproductive isolation even between genetically divergent taxon, although this level of reproductive isolation is not uncommon in nature between divergent taxa (Lu *et al*. 2020; McEntee *et al*. 2020; Pérea-Pedraza *et al*. 2021). Notwithstanding this high propensity and occurrence of hybridisation within the family, the Philippines being a particular hot spot, the majority of hybrids do not result in speciation events with most hybrids considered episodic (for a synopsis of hybridisation in Strombidae, see Maxwell *et al*. 1999). However, hybridisation between the Philippine stromboidian genera *Lambis* Röding, 1798 and *Millepes* Mörch, 1852 has resulted in at least one record of speciation, with the recognition of *Millepes achnoides* (Shikama, 1971) as having modern hybrid ancestry (Maxwell *et al*. 2019). In this paper, we present a novel example of episodic hybridisation between two different genera within Strombidae from Đảo Phú Quý, Vietnam, and this new hybrid highlights of hybridation potential of taxon with the family.

METHODS

During a trip to Đảo Phú Quý, off the southeast Coast of Vietnam, the second author was hunting during March 2020 for specimens of *Harpago chiragra* (Linné, 1758), known to fishermen as Ốc bàn tay (hand), and *Solidistrombus latissimus* (Linné, 1758), also known to locals as Ốc bàn ủi (flat iron), both being collected for consumption (Figure 1). Within the catch of returning fishermen, the second author noted an unusually formed specimen, and this was purchased for future study. This specimen was later brought to the attention of the first author, who recognised it as a putative hybrid between the two fished species of molluscs. The putative hybrid is described and compared with the proposed parents and illustrated along with examples of both species obtained from the same catch (Figure 2). The provided length of shell reflects the maximum length, including digitations.

SYSTEMATICS

Harpago Mörch, 1852

Type. *Strombus chiragra* Linné, 1758.

Diagnosis. The shell is large to very large, with six extended digitations. The last anterior digitation, the anterior canal, is reflected to the left of the shell axis. The second anterior canal forms an extension of the stromboidal lobe and is reflected to the right. The stromboidal sinus, which serves to allow the eye to extend when the shell is lying flat, is u-shaped and well defined. The final posterior digitation crosses the spire almost perpendicular to the axis and then is reflected posteriorly. The aperture is quadrate with the second and third posterior digitations arising from the corners of the aperture; the middle digitation arising near the halfway point along the aperture. The dorsum is crossed by strong wide ribs that have wide interspaces. The posterior canal is constricted. The aperture is constricted internally, and the columella is thickened anteriorly forming a long plate at the lower half.

Remarks. There are three species in the *Harpago* complex. *Harpago arthritica* (Röding, 1798) from the African coasts has a distinctively lirate aperture within the aperture. The Coral Sea atoll species, *Harpago rugosa* (Sowerby, 1842), is a more delicate species with a deep red aperture. The most widespread species within the complex is *Harpago chiragra*, ranging throughout the tropics from India to

French Polynesia. It varies in rarity, being uncommon in Queensland, but collected commercially in the central and northern Pacific (Figure 1). *Harpago chiragra* is the only member of the genus to come from Đảo Phú Quý. Members of the *Harpago* do not show a great deal of diversity in form other than the occasional extra digitation.

Solidistrombus Dekkers, 2008

Type. *Strombus sinuatus* Humphrey, 1786.
Original Diagnosis. "Shell large to very large, solid to very thick walls, medium weight to heavy weight shells. The form of the shell is not triangular (as in *Tricornis*), but rather oval. Spire tall columella and aperture smooth outer lip very thick, broadly flared with striking posterior expansions in the form of a flap or finger-like digitations. Outer lip has a striking sharp ridge or a thickened ridge (without the sharp ridge) which readily characterises the genus. Body whorls decorated with knobs, sometimes large and mostly on or around the broad shoulder. Stromboid notch is present, mostly large" (Dekkers 2008, p. 45).
Remarks. The genus is restricted to the central and western Pacific into Indonesia, with two member species coming from the Đảo Phú Quý, *Solidistrombus latissimus* and *S. sinuatus* (Lightfoot, 1786). While rare in other parts of their range (such as Queensland), these two species are regularly encountered in the northern range where they are targeted for eating by local fishermen (Figure 1). The attractive *S. taurus* (Reeve, 1857) is known from islands in the central Pacific where it forms colonies and is periodically collected for the specimen trade and is not hunted commercially. The rarest of the complex, *S. theristies* (Swainson, 1822), is known form the Coral Sea and surrounding reef systems, and Japan. Members of the *Solidistrombus* have a stable form varying little across their range.

***Harpago chiragra* (Linné, 1758) x *Solidistrombus latissimus* (Linné, 1758)**

Description. The shell is large and heavy with an ovate shape with a fringed outer lip and a few rudimentary formed digitations. The dorsum has raised broad spiral ribs with interspecies that contain finer spiral threads. The teleoconch is triangulate, with sightly concave whorls with moderate nodulations. The anterior canal forms the last digitiation which is short but distinctly reflected to the left. The aperture is primarily smooth and white internally, with a moderate constriction that is tinged with red within; the posterior outer lip is forming a broad, thin flange that is marginally coloured russet. The central outer lip is thickened, and the anterior lobe is broad and does not have a digitation. The stromboidal sinus is well defined. The columella is well defined and smooth. The posterior canal is open. Maximum length 14.5 cm (Figure 2A)
Remarks. There are distinctive features found in the putative hybrid that is unique to its parents (Figure 2B-C). The dorsum carries a similar form to *Harpago chiragra*, with broad raised ribs with interspaces that contain two or three finer raised spiral threads, both features absent in *Solidistrombus*. Similarly, the teleoconch follows after *H. chiagra* being more triangulate and nodulous than *S. latissimus*. The ventral side is more akin to *S. latissimus*; there is the broad ovate flaring lip, with a thickening mid-length typical of that species. While there are rudimentary legs and a general spininess to the outer lip margin found in *H. chiragra*, these are rudimentarily formed. Most striking is the reflected and extended anterior canal of the hybrid. The lack of digitation extending out of the stromboidal lobe typically is a trait closer to *S. latissimus* than to *H. chiragra*. The hybrid aperture colour is typical of *S. latissimus,* being orange toward the outer lip with a white inner,

unlike the nearly uniform red to pink interior typical of *H. chiragra.*

DISCUSSION

There are literary records for both putative intra-generic and inter-generic hybridisation between *Solidistrombus* and other members of the *Neoaligerinae*, the *Lambis* and *Harpago* in particular (Maxwell *et al.* 2019). While intra-generic hybridisation between *Solidistrombus taurus* and *S. sinuatus* and inter-generic hybrids between *Lambis lambis* (Linné, 1758) and *Solidistrombus latissimus* are recorded (Kronenberg, 2008), this is the first record of a hybrid between *Solidistrombus* and *Harpago.* Given that this the first recorded example of hybridising of these two sympatric species and that there is no evidence for the establishment of a population, the hybridisation event is to be considered episodic (Maxwell *et al.* 2019).

While the hybridisation event presented in this paper is episodic, when it is contextualized with the wider potential for stromboidian hybridisation (see Maxwell *et al.* 2019), and the frequency of those hybrids, it cannot be dismissed that the stromboidians have entered a stage of hybrid driven speciation. It is to be expected that as our knowledge of the family grows, and more samples come to hand, that novel taxa with a hybrid ancestry will be described (Maxwell *et al.* 2019). The level of hybridisation within the family has resulted in the blurring not only of some species boundaries in terms of morphology creating taxonomic inconstancies.

This morpholocal bluring caused by hybrids in turn may have led to the aggregating genera, such as *Millepes* with *Lambis* (Dekkers 2008), although Dekkers (2008) did not offer any rationale the decision to merge the genera. In this case, there is enough morphological justification for the reinstatement of the genus *Millepes* (see Abbott 1961) irrespective of the level of hybridisation with sister genera (Maxwell *et al.* 2019). The use of reproductive barriers as basis for genera would lead to the collapse of much of the stromboidian taxonomy, resulting in large aggregations of species within a genus. In addition to the example presented in this paper where the two genera are untenable under a reproductive isolation model, a great many other genera, such as *Conomurex* Fisher, 1884 and *Gibberulus* Jousseaume, 1888 (Dekkers and Maxwell 2018), would have to be merged. This despite their significant anatomical differences (Maxwell and Rymer 2021). The flow-on of such a theoretical approach would create chaos for the systematics across diverse phyla and result in a great loss of relational meaning between taxa that is implicit within the nomenclature (Oyebanji *et al.* 2020; Akita *et al.* 2021). Therefore, the use of reproductive isolation as means of assessing taxonomic validity is crude and should be avoided being grounded in what is to be considered blunt and anachronistic speciation theory (Maxwell *et al.* 2020).

CONCLUSION

This paper presents the first example of inter-generic hybridisation within Strombidae between *Harpago chiragra* and *Solidistrombus latissimus*. The high propensity for hybridisation within this family gives rise for opportunistic introgression and the fixation of traits. This can make the discernment of species boundaries problematic between species where hybridisation is common. Given the high rates of hybridisation with the family, particularly inter-generic, it is problematic to hybrids as a basis to argue for taxonomic division, or validity of genera, without risking the potential collapse of the entire nomenclature into a mono-generic system, not dissimilar to the revision of

Abbott (1960). Furthermore, the high rates of hybridisation also increase the propensity for such mating to result in new species.

LITERATURE CITED

Abbott, R.T. 1960. The genus *Strombus* in the Indo-Pacific. *Indo-Pacific Mollusca*, 1(2): 33-146.

Abbott, R.T. 1961. The genus *Lambis* in the Indo-Pacific. *Indo-Pacific Mollusca*, 1(3): 147-174.

Akita, S., K. Koiwai, T. Ishikawa, T. Sakamoto, T. Yoshimura, S. Kiyomoto, K. Nanri, Y. Tamayama-Kato, A. Kurashima, T. Hanyuda, S. Shimada., H. Kawai, & D. Fujita. 2021. Molecular evidence for naturally occurring intra- and inter-generic hybridization in the genus *Ecklonia* (Laminariales, Phaeophyceae). Phycologia 60(2): 170-179. DOI: 10.1080/00318884.2021.1885246

Costa, D., G. Sotelo, A. Kaliontzopoulou, J. Carvalho, R. Butlin, J. Hollander, & R. Faria. 2019. Hybridization patterns between two marine snails, *Littorina fabalis* and *L. obtusata*. Ecol Evol 10: 1158-1179. DOI: 10.1002/ece3.5943

Dekkers, A.M., S.J. Maxwell. 2018. An intergeneric hybrid between the genera *Conomurex* Bayle in P. Fischer, 1884 and *Gibberulus* Jousseaume, 1888 (Gastropoda: Strombidae) from South Africa. The Festivus 50(3): 158-163. DOI: 10.54173/F503158

Dekkers, A.M. 2008. Revision of the family Strombidae (Gastropoda) on the supra specific level, part 1. De Kreukel 44(3): 35-64

Everson, K.M., S.M. Goodma, & L.E. Olson. 2020. Speciation and gene flow in two sympatric small mammals from Madagascar, Microgale fotsifotsy and M. soricoides (Mammalia: Tenrecidae). Mol Ecol 29(9): 1717-1729. DOI: 10.1111/mec.15433

Fischer, P. 1880-1887. Manuel de conchyliologie et de paléontologie conchyliologique, ou histoire naturelle des mollusques vivants et fossiles suivi d'un Appendice sur les Brachiopodes par D. P. Oehlert. Avec 23 planches contenant 600 figures dessinées par S. P. Woodward. Part 7 (1884) Paris: F. Savy.

Hamilton, Z.R., & M.S. Johnson. 2015. Hybridization between genetically and morphologically divergent forms of *Rhagada* (Gastropoda: Camaenidae) snails at a zone of secondary contact. Biol J of the Linn Soc 114: 348-362. DOI: 10.1111/bij.12410

Jousseaume, F. 1888. Description des mollusques recueillis par M. le Dr. Faurot dans la Mer Rouge et le Golfe d'Aden. Mém Soc Zool Fr 1:165-223.

Kronenberg, G.S. 2008. An intergeneric hybrid (Gastropoda: Caernogastropopda: Strombidae) with remarks on the subdivision of Indo-Pacific *Tricornis*. Basteria 72: 331-343.

Lightfoot, J. 1786. A Catalogue of the Portland Museum, lately the property of the Dutchess Dowager of Portland, deceased; which will be sold by auction by Mr. Skinner & Co. London.

Linné, C. 1758. Systema Naturae per Regna Tria Naturae Secundum Classes, Ordines, Genera, Species, cum Caracteribus, Differentiis, Synonymis, Locis, volume 1, 10th edn. Reformata. Holmiae, Laurentii Salvii. 824 pp. DOI: 10.5962/bhl.title.542

Lu, A., Sirimanna D.G.R, L. Wijayathunga, R. Vandercone, & R. Salmi. 2020. Mixed-species associations and attempted mating suggest hybridization between purple-faced and tufted gray langurs of Sri Lanka. Primates 62(1): 11-17. DOI: 10.1007/s10329-020-00852-z

Matute, D.R., A.A. Comeault, E. Earley, A. Serrato-Capuchina, D. Peede, A. Monroy-Eklund, W. Huang, C.D. Jones, T.F.C. Mackay, & J.A. Coyne. 2020. Rapid and predictable evolution of admixed populations between two Drosophila species pairs. Genetics 214(1): 211-230. DOI: 10.1534/genetics.119.302685

Maxwell, S.J., A.V. Bordon, T.L. Rymer, & B.C. Congdon. 2019. The birth of a species and the validity of hybrid nomenclature demonstrated with a revision of hybrid taxa within Strombidae (Neostromboidae). Proc Biol Soc Wash 132(1): 119-130. DOI: 10.2988/19-00007

Maxwell, S.J., B.C. Congdon, & T.L. Rymer. 2020. Essentialistic Pluralism: The theory of Spatio-temporal positioning of species using integrated taxonomy. Proc R Soc Qld 124: 83-97.

Maxwell, S.J., & A.M. Dekkers. 2019. A new name for *Altivasum typicum* Hedley, 1916 fide Dekkers and Maxwell, 2018 and the description of *Altivasum clarksoni* nov. sp. The Festivus 51(2): 171-176. DOI: 10.54173/F513171

Maxwell, S.J., T.L. Rymer, M.K. Rowell, L.C. Hernandez Duran, D.P. Berschauer, M. Underdown, E.J. Petuch, & A.M. Dekkers. 2021. Defining and Bringing Relevance of Meaning to Species Group-Level Taxa. Proc Biol Soc Wash 134: 27-28. DOI: 10.2988/0006-324X-134.1.89

Maxwell, S.J., & T.L. Rymer. 2021. Are the ICZN and PhyloCode that incompatible? A summary of the shifts in Stromboidean taxonomy and the definition of two new subfamilies in Stromboidea (Mollusca, Neostromboidae). The Festivus 53(1): 44-51. DOI: 10.54173/F531044

McEntee, J.P., J.G. Burleigh, & S. Singhal. 2020. Dispersal Predicts Hybrid Zone Widths across Animal Diversity: Implications for Species Borders under Incomplete Reproductive Isolation. Am Nat 196(1): 9-28. DOI: 10.1086/709109

Mörch, O.A.L. 1852. Catalogus Conchyliorum quae Reliquit D. Alphonso d'Aguirra & Gadea comes de Yoldi: Regisdanlae Cubiculariorum Princeps, Ordinis Dannebrogici in Prima Classe & Ordinis Caroli Terth Eques. Ludvici Kleini, Hafniae, 170 pp. DOI: 10.5962/bhl.title.12921

Nikolic, N., S. Liu, M.W. Jacobsen, B. Jónsson, L. Bernatchez, P. Gagnaire, & M.M. Hansen. 2020. Speciation history of European (*Anguilla anguilla*) and American eel (*A. rostrata*), analysed using genomic data. Mol Ecol 29(3): 565-577. DOI: 10.1111/mec.15342

Oyebanji, O.O., E.C. Chukwuma, K.A. Bolarinwa, O.I. Adejobi, S.B. Adeyemi, & A.O. Ayoola. 2020. Re-evaluation of the phylogenetic relationships and species delimitation of two closely related families (Lamiaceae and Verbenaceae) using two DNA barcode markers. J Biosci 45(1): 96. DOI: 10.1007/s12038-020-00061-2

Parker, T.V., C.Y. Rodriguez, G. Wechsler, & M.C. Vasey. 2020. Allopatry, hybridazation, and reproductive isolation in *Archostaphylos*. Am J Bot 107(12): 1798-1814. DOI: 10.1002/ajb2.1576

Pérez-Pedraza, A., H. Rodríguez-Correa, S. Valencia-Ávalos, C.A. Torres-Miranda, M. Arenas-Navarro, & K. Oyama. 2021. Effect of hybridization on the morphological differentiation of the red oaks *Quercus acutifolia* and *Quercus grahamii* (Fagaceae). Plant Syst Evol 307(3). DOI: 10.1007/s00606-021-01757-0

Reeve, L.A. 1857-1858. Descriptions of seven new shells from the collection of the Hon. Sir David Barclay, of Port Louis, Mauritius. Proc. Zool. Soc. 25: 207-210. DOI: 10.1111/j.1096-3642.1857.tb01226.x

Röding, P.F. 1798. Museum Boltenianum sive catalogus cimeliorum e tribus regnis naturae que olim collegerat Joa. Fried Bolten, M.D.p.d. per XL annos proto physicus Hamburgensis. Pars Secunda continens Conchylia sive Testacea univalvia, Bivalvia & multivalvia. Hamburg, 199pp.

Schweizer, M., V. Warmuth, N.A. Kakhki, M. Aliabadian, M. Förschler, H. Shirihai, A. Suh, & R. Burri. 2019. Parallel plumage colour evolution and introgressive hybridization in wheatears. J Evol Biol 32(1): 100-110. DOI: 10.1111/jeb.13401

Shikama, T. 1971. On some noteworth marine gastropoda from southwest Japan (III). Sci. Rep. of the Yokahama Natl Univ 18: 27-35.

Slager, D.L., K.L. Epperly, R.R. Ha, S. Rohwer, C. Wood, C. Hemert, & J. Klicka. 2020. Cryptic and extensive hybridization between ancient lineages of American crows. Mol Ecol 29(5): 956-969. DOI: 10.1111/mec.15377

Sowerby, G.B. 1842. Monograph of the genus *Strombus*. In: Thesaurus Conchyliorum, or, Monographs of Genera of Shells. Volume 1(1). Sowerby, London.

Van Wyk, A.M., D.L. Dalton, A. Kotzé, J.P. Grobler, P.S. Mokgokong, A.S. Kropff, & B.J. van Vuuren. 2019. Assessing introgressive hybridization in roan antelope (*Hippotragus equinus*): Lessons from South Africa. PloS One 14(10): e0213961. DOI: 10.1371/journal.pone.0213961

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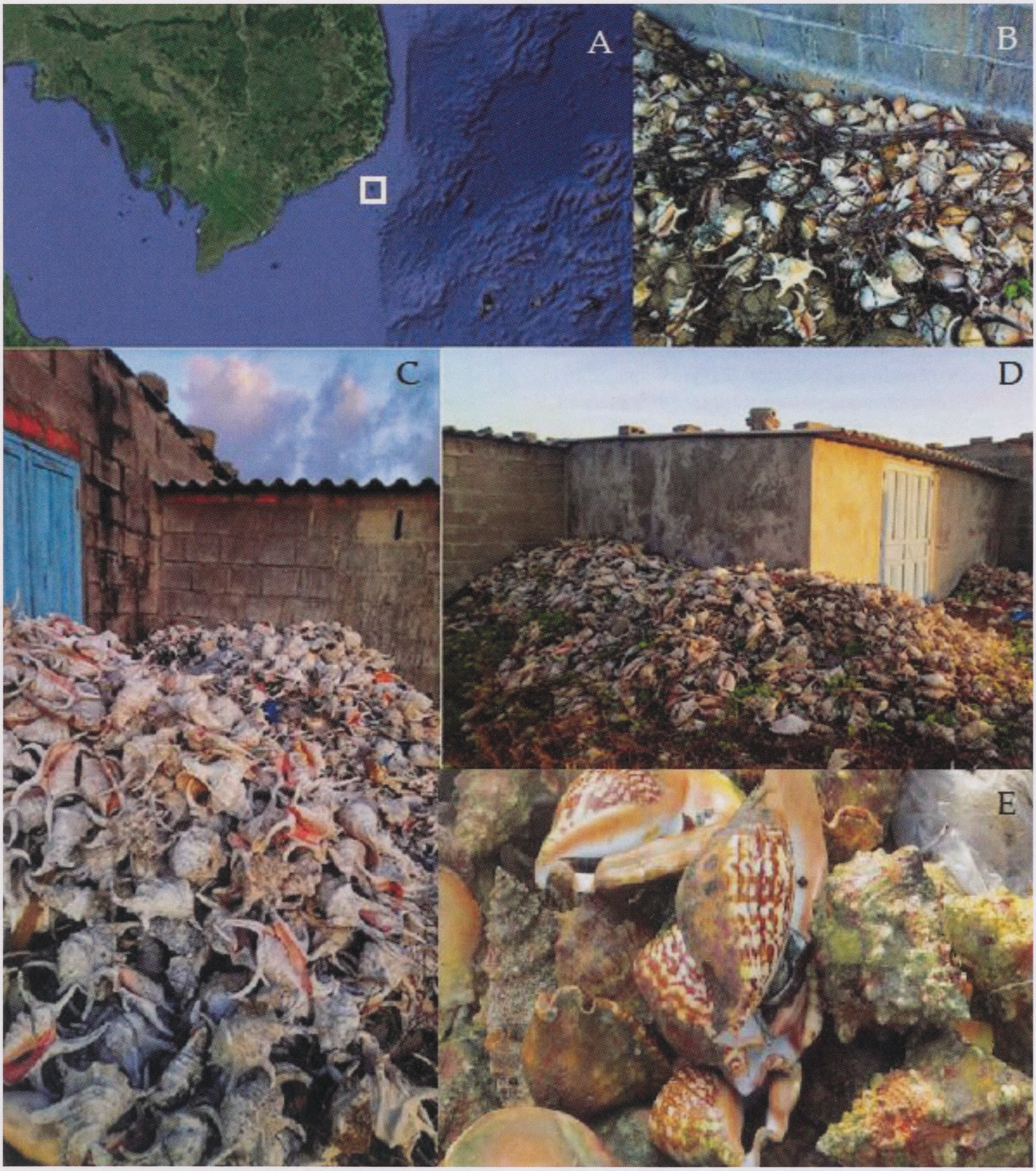

Figure 1. Đảo Phú Quý off the southeast coast of Vientam **(A)**, and the historical remnants of prior fishing trips to collect mollusca for food showing mounds of *Harpago chiragra* (Linné, 1758), **(B-D)**, and the fresh catch, including *Solidistrombus latissimus* (Linné, 1758), **(E)** (map: GoogleEarth accessed 13/10/2021; images of middens: by Khang Ocean, 03/2020).

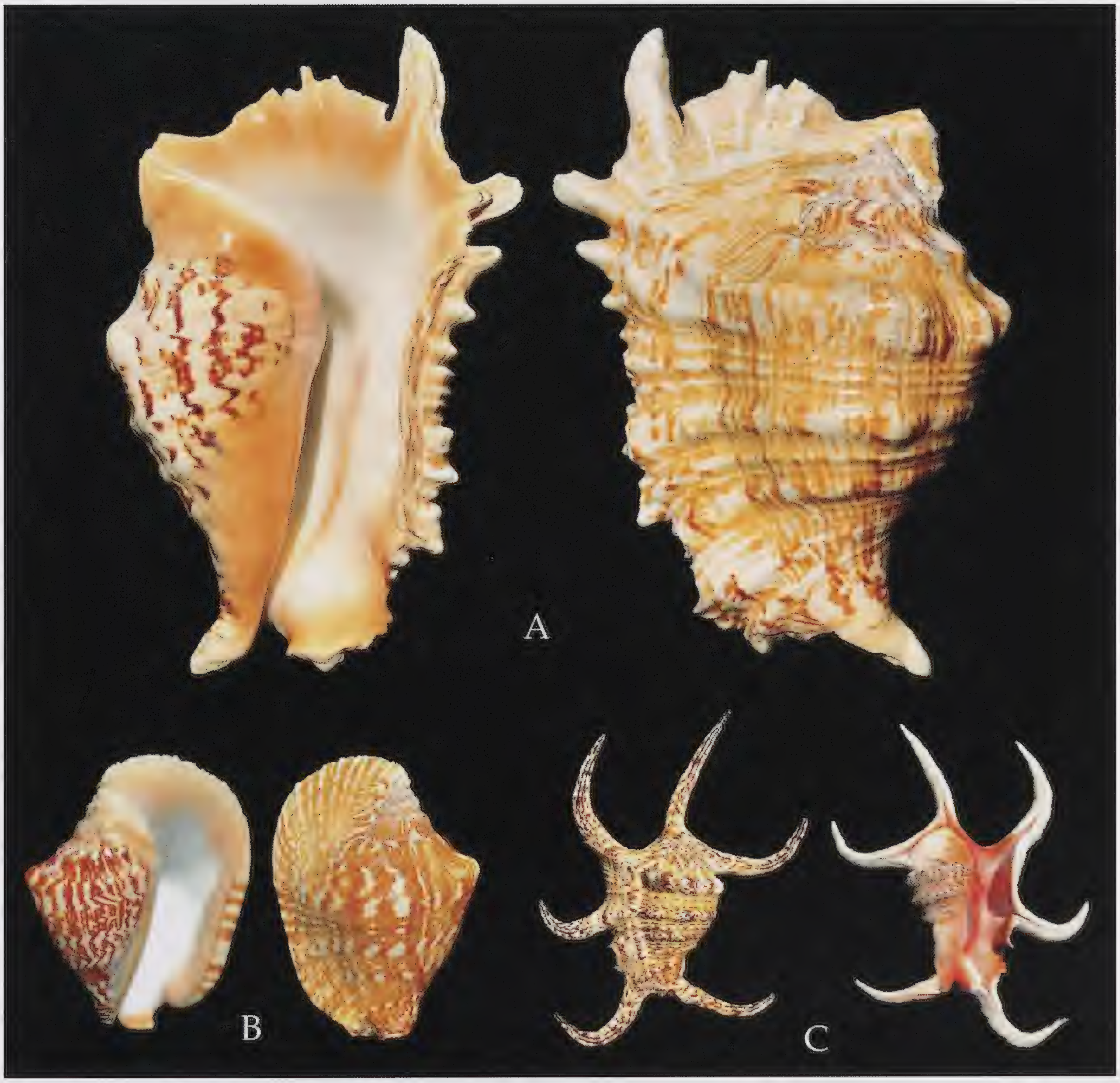

Figure 2. The hybrid showing its parental species all from Đảo Phú Quý, Vietnam: **A**= putative hybrid between *Harpago chiragra* (Linné, 1758) and *Solidistrombus latissimus*, 14.5 cm (Collection of Khang Ocean); **B**= *Solidistrombus latissimus* (Linné, 1758) 16.0 cm (Collection of Khang Ocean); **C**= *Harpago chiragra* 25.0 cm (Collection of Khang Ocean).

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Biogeographical Isolation and a Sundaland Relict Cone Shell from Sumbawa Island, Indonesia

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ABSTRACT A new cone species, *Cylinder sumbawaensis* Verbinnen, 2022, was recently described from the Saleh Gulf (Teluk Saleh) of Sumbawa, Nusa Tenggara Islands (Lesser Sunda Islands), Indonesia. The new species is morphologically very similar to *Cylinder bengalensis* (Okutani, 1968) from the Gulf of Bengal and Andaman Sea and represents a geographically-isolated relict of a once widespread Indian Ocean-derived molluscan fauna that extended all along the coast of the Middle Pleistocene Sundaland Peninsula.

KEY WORDS Conidae, *Cylinder*, Indonesia, Lesser Sunda Islands, Sumbawa, Teluk Saleh

INTRODUCTION

A new conid species, *Cylinder sumbawaensis* Verbinnen, 2022, was recently described from the Teluk Saleh of Sumbawa, Nusa Tenggara Islands, Indonesia. (See Verbinnen, 2022) This article opines on the evolution and biogeographical isolation of *C. sumbawaensis* and analyzes its morphology in comparison to its well known sister species *Cylinder bengalensis* which has a wide spread distribution throughout the Gulf of Bengal and Andaman Sea.

The northern Lesser Sunda Islands of Indonesia, extending from Lombok to Wetar Islands, constitute an "evolutionary hot spot" referred to as the Nusa Tenggaran Infraprovince (Petuch and Berschauer, 2020: 190-191). This special area of increased speciation and evolution is one of the centers of biodiversity within the Indonesian Subprovince of the Indo-Malayan Molluscan Province and houses a large number of highly-restricted endemic species (Petuch and Berschauer, 2020: 203). Some of these Nusa Tenggaran endemics include the cowry *Erronea vredenburgi* Schilder, 1927, the volute *Cymbiola chrysostoma* (Swainson, 1824), and the cones *Cylinder johnabbasi* Petuch & Berschauer, 2018, *Phasmoconus giorossii* (Bozzetti, 2006), *Graphiconus wittigi* (Walls, 1977), and several closely-knit sibling taxa in the *Eugeniconus victor* (Broderip, 1842) species complex (Parsons *et al.*, 2020). Recently, increased collecting and exploration on Sumbawa Island, at the western end of the archipelago, has resulted in the discovery of an unusual new member of the genus *Cylinder* Montfort, 1810. This distinctive new cone shell, *Cylinder sumbawaensis* Verbinnen, 2022, was recently described as a subspecies of *Cylinder bengalensis* (Okutani, 1968), and as discussed in the following sections the authors consider to be a full species.

The principal geographical feature on Sumbawa Island, the Teluk Saleh (Saleh Gulf), is a large, almost land-locked, engulfment that only connects to the open Flores Sea through two small, narrow straits on either side of Mojo Island, along its northern end (Figure 1). This small, sheltered gulf provides the perfect environment for extensive coral reef growth and its numerous small islands and shallow coastline support major reef complexes and a very rich fauna of marine mollusks. Teluk Saleh, itself, formed from a series of volcanic eruptions, and their resultant calderas, during the late Pleistocene and is geologically related to the adjacent Tambora Volcano. The entire Lesser Sunda Archipelago dates from the late Pliocene and formed as a series of volcanoes along an accretionary margin related to the Sunda/Sumatra Subduction Zone. Throughout the late Pliocene and Early Pleistocene, the islands expanded in size due to increased volcanism and formed a closely-spaced chain of large islands, separated by narrow, deep channels.

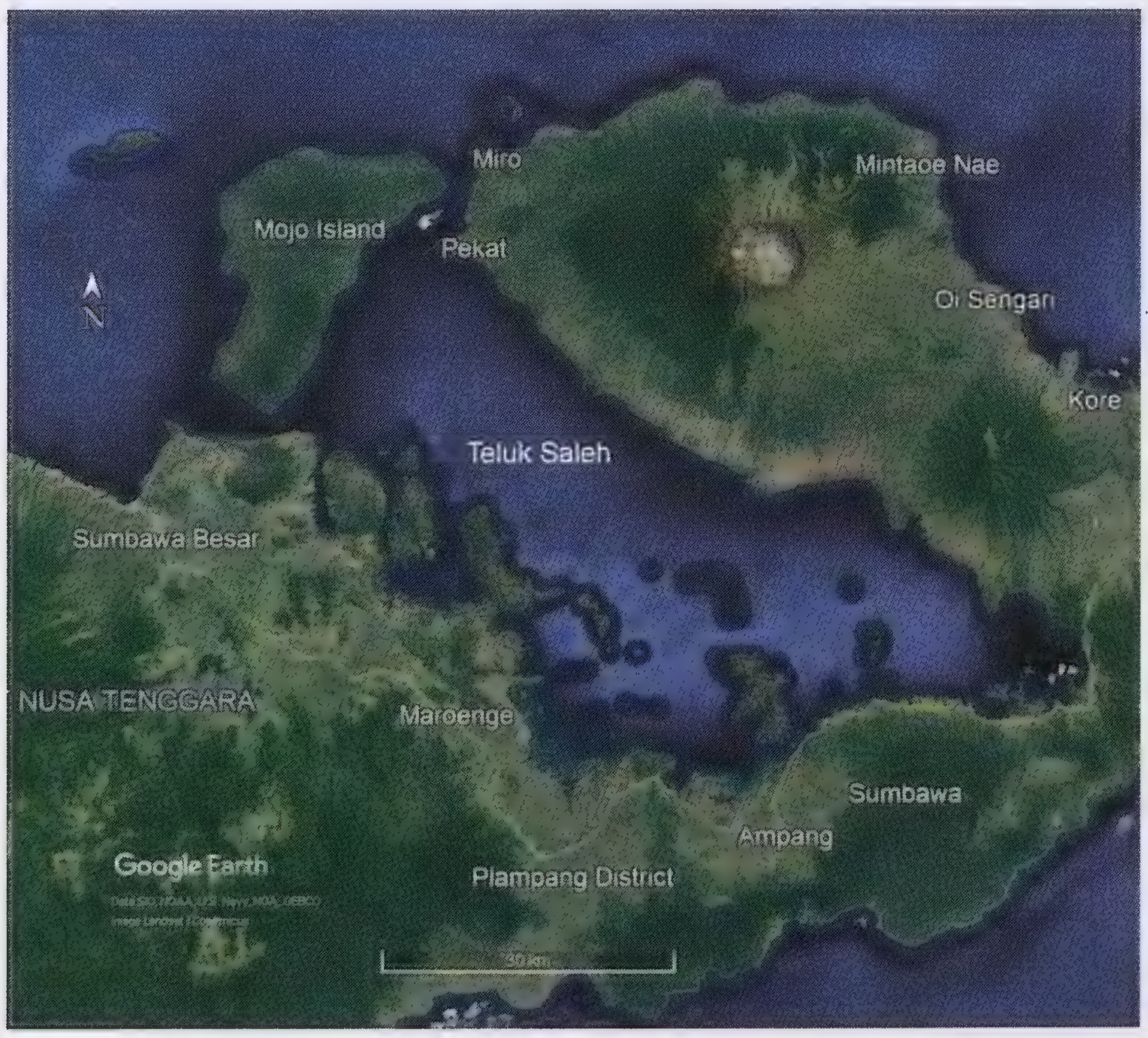

Figure 1. Satellite map of Teluk Saleh, Sumbawa Island. (Google Earth Image, 2019)

The enclosed and sheltered Teluk Saleh of Sumbawa Island has acted as a biogeographical refugium and contains a relict pocket of the Pleistocene Sundalandian marine world, analogous to the situation in the Caribbean Sea (Petuch, 1982). Here, a remnant of an ancestral eastern Indian Ocean *Cylinder* species complex has managed to survive and evolve into a completely new endemic Sumbawan species.

Main shell morphological features were used during this study to differentiate the new species from its closest congener within the genus *Cylinder*. The terminology used within this description follow Röckel *et al.* (1995), Monnier *et al.* (2018), Monnier *et al.* (2021), and Veldsman (2022). The following abbreviations refer to measurements were taken for each specimen studied:

- SL – maximum shell length (mm)
- MD – maximum diameter (mm)
- H – height (mm)
- AH – aperture height (mm)
- HMD – height of maximum diameter (mm)
- SH – spire height (SL-AH)
- SP – spire percentage of length (SH/SL x 100)
- RD – relative diameter (MD/AH)
- PMD – relative position of the maximum diameter (HMD/AH)
- RSH – relative spire height (SH/SL)
- V – estimated 'model' volume (SL x MD x H)
- SR – shell ratio factor (SL/MD x PMD)

A total of 15 adult specimens, along with eight juvenile (not fully developed) specimens of *Cylinder sumbawaensis* Verbinnen, 2022 from Teluk Saleh, Sumbawa Island, Indonesia, were studied, measured, and included in the data tables (Appendix A), along with a total of 16 specimens of *Cylinder bengalensis*.

SYSTEMATICS

Phylum Mollusca
Class Gastropoda

Subclass Sorbeoconcha
Order Prosobranchia
Infraorder Neogastropoda
Superfamily Conoidea
Family Conidae
Subfamily Coninae
Genus *Cylinder* Montfort, 1810
Conus textile Linnaeus, 1758 (type by original designation)

Cylinder sumbawaensis Verbinnen, 2022
(Plate 1, Figures A-F)

Review of Morphology. Shell moderately large to large (57-90 mm), moderately heavy, profile elongate conical, and cylindrical-straight. Body whorl straight, narrowing and angling in at anterior end. High stepped spire, relatively straight in outline. Shallow incised sutures on spire. Shallow, relatively straight sutural ramps with very fine radial striae. Protoconch sharp, pinkish colored. Shoulder sharply angulate, moderately broad profile. Moderately fine spiral striae around the body whorl, the posterior half faint spiral striae visible and the anterior half having stronger spiral striae on the outer part of the whorl towards the lip. Aperture narrow, slightly broad, with a straight lip, highly angled in at the basal part of the columella. Background color off-white, with two very broad bands around the body whorl, one posterior side of the center and the second towards the anterior side, both consisting of a light brown coloration with thin dark brown spiral lines, mostly broken with off-white large tent pattern, and very wavy thick axial dark brown lines. Three spiral bands consisting of tent pattern of large to very large triangles, the first at the posterior end below the shoulder, the second around the center and the last at the anterior end. The sharp side of the shoulder consists of dark brown blotches to thin markings, and off-white tent markings.

Study material. Eighteen specimens in the collection of Stephan G. Veldsman measuring between 83.92 and 39.76 mm in length; two specimens in the collection of Edward J. Petuch measuring 80.47 and 75.48 mm in length; and one specimen in the collection of David P. Berschauer measuring 68.50 mm in length.

Type Locality. 20 m depth off Dangarbesar, Teluk Saleh (Saleh Gulf), Sumbawa Island, West Nusa Tenggara Province, Indonesia.

Distribution. Only known from Teluk Saleh, Sumbawa Island, Indonesia, collected by hookah diver fishing for lobsters at approximately 20 m depth.

DISCUSSION

During the Chibanian Age of the Middle Pleistocene (400,000 years BP), a major world-wide climatic cooling event took place and sea levels dropped as much as 200 m; this resulted in the islands combining into a single fused landmass called "Sundaland" (Petuch and Berschauer, 2020: 190; Zahirovic, *et al.* 2014). In its maximum development, Sundaland extended from the Isthmus of Kra in Thailand and the island of Sumatra in Indonesia eastward all the way to Timor. As a single, fused landmass, the giant peninsula allowed marine ecosystems from the Gulf of Bengal and Andaman Sea to establish themselves along the shoreline, all the way to the present-day Maluku Islands (Moluccas Islands). This ecological continuum allowed for a free interchange of marine organisms and enlarged ranges for many Gulf of Bengal and Indian Ocean species (Figure 2).

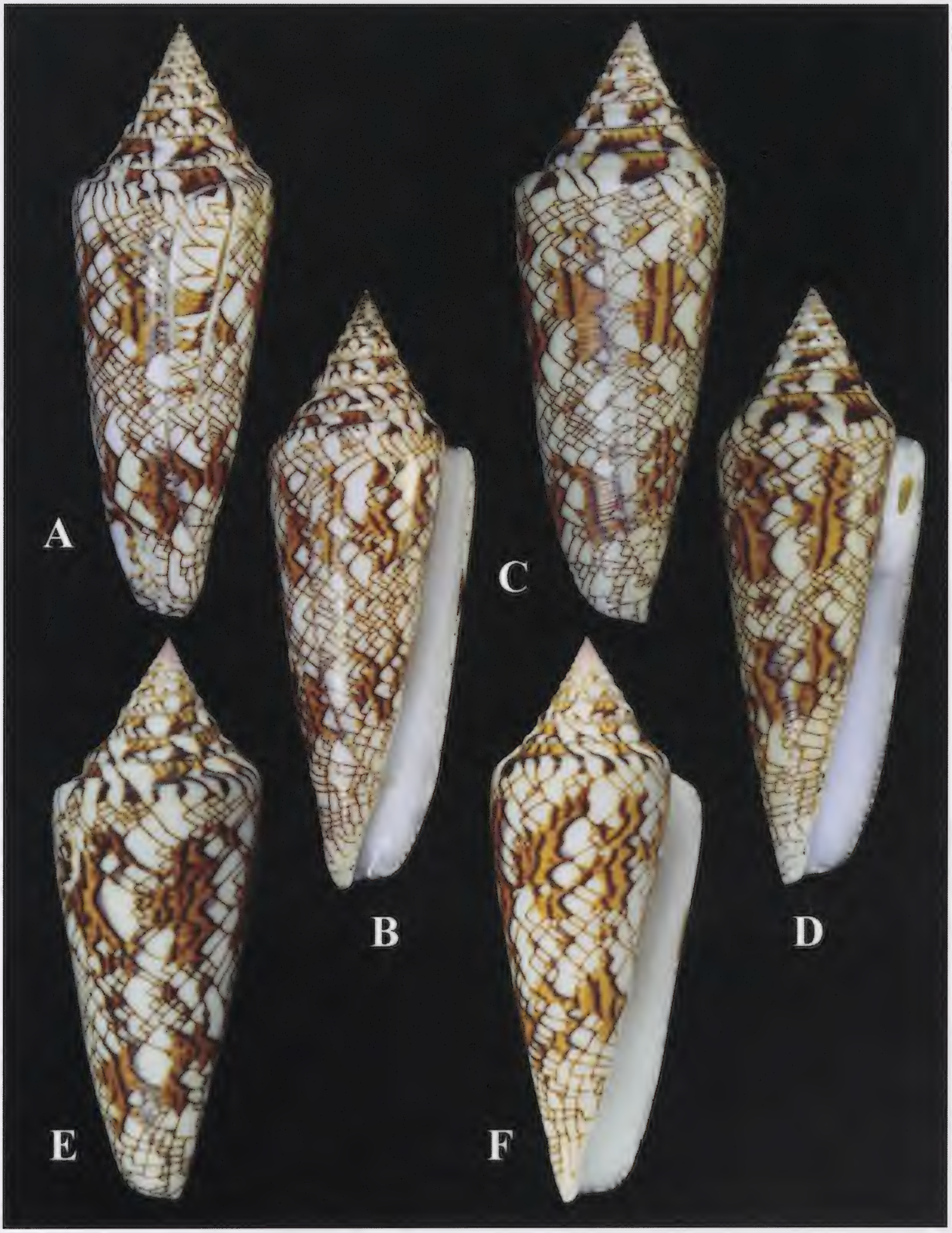

Plate 1. *Cylinder sumbawaensis* Verbinnen, 2022. **A, B** = Specimen of *C. sumbawaensis*, measuring 83.92 mm in length, Veldsman Coll.; **C, D** = *C. sumbawaensis* specimen measuring 73.10 mm in length, Veldsman Coll.; **E, F** = *C. sumbawaensis* specimen measuring 68.50 mm in length, Berschauer Coll.

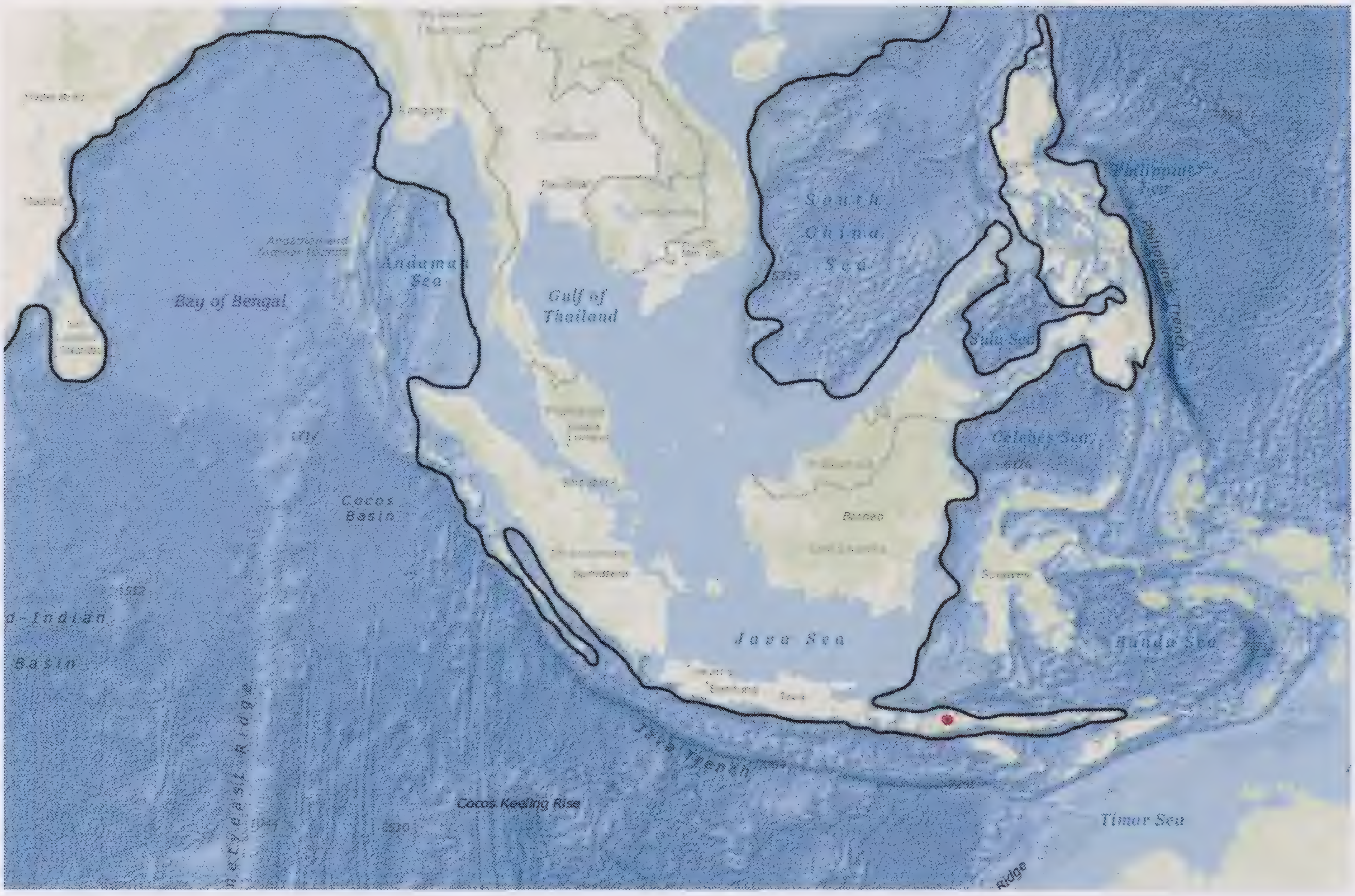

Figure 2. Middle Pleistocene coastlines of Sundaland compared to present day. (Adapted from Wisnu-Aji, 2016, and Zahirovic, *et al.* 2014.) The red dot shows the modern day location of Teluk Saleh, Sumbawa Island, Indonesia

During the Late Pleistocene (Tarantian Age), sea level rose rapidly and flooded many of the lower-relief Sundaland areas that previously had been channels between individual islands. Once these channels had re-developed, and the Java and Banda Seas had inundated northern Sundaland, the once-continuous ranges of the resident marine mollusks became separated into geographically-smaller areas due to the newly-created ecological barriers. Being genetically-isolated, these small populations either became extinct or underwent genetic drift and have evolved into two sibling species before the Holocene, *Cylinder bengalensis* in the north and *C. sumbawaensis* in the south.

Cylinder bengalensis (Okutani, 1968) is a well-known species from the Gulf of Bengal and Andaman Sea. The species has been recorded off southern India, Maldives, Sri Lanka, Myanmar and Thailand, and is trawled from 45 to 300 m depth. *Cylinder bengalensis* was originally described from the Gulf of Bengal from a depth of 50 m (Okutani, 1968). *Cylinder sumbawaensis* is a smaller cone species that shares several shell morphological features in common with *C. bengalensis* was discovered in Teluk Saleh, Sumbawa Island, Indonesia. The two localities of the two populations are biogeographically far from each other with no direct link in-between (Plate 2, and Figure 3).

The morphometric parameters for the adult specimens of *C. sumbawaensis*, and *C. bengalensis* are summarized in Tables 1 and 2, whereas the detailed information is tabled in Appendix A. Most of the morphometric parameters are very similar and overlapping, and are characteristic of the *Cylinder* genus.

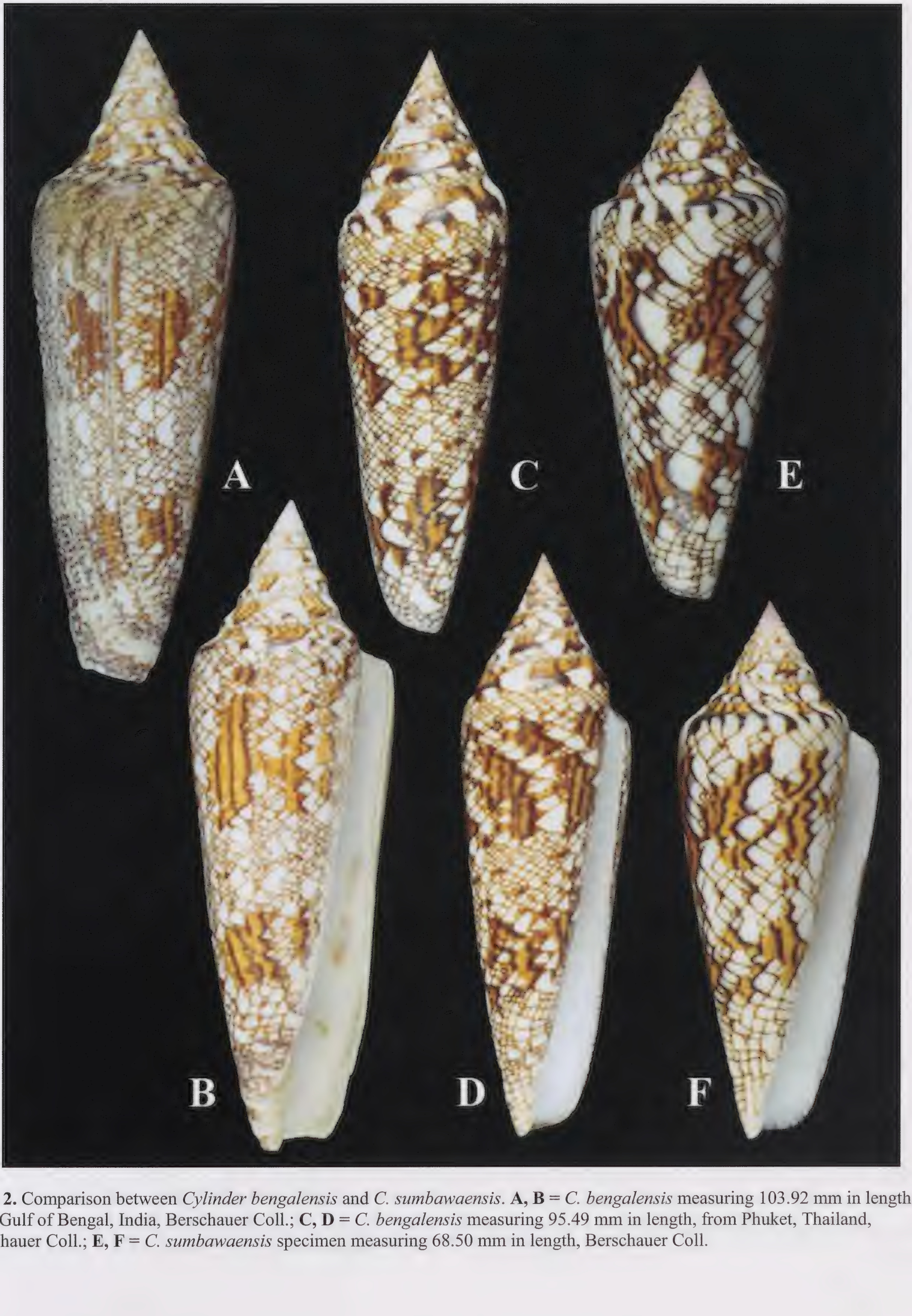

Plate 2. Comparison between *Cylinder bengalensis* and *C. sumbawaensis*. **A, B** = *C. bengalensis* measuring 103.92 mm in length, from Gulf of Bengal, India, Berschauer Coll.; **C, D** = *C. bengalensis* measuring 95.49 mm in length, from Phuket, Thailand, Berschauer Coll.; **E, F** = *C. sumbawaensis* specimen measuring 68.50 mm in length, Berschauer Coll.

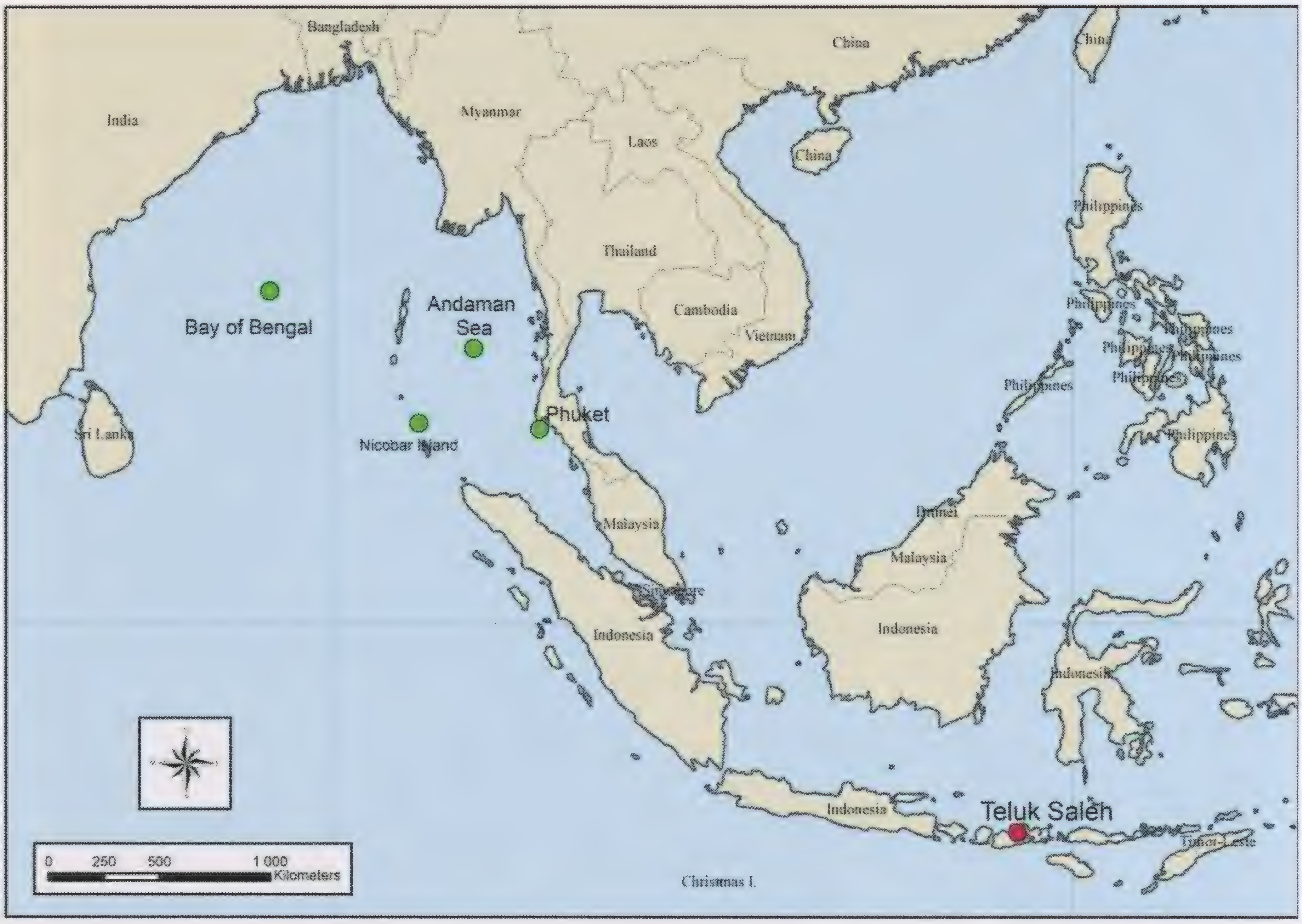

Figure 3. Relative distributions of *Cylinder bengalensis* (green dots), and *C. sumbawaensis* (red dot). Map compiled by S.G. Veldsman (2022).

	Maximum length (SL) - mm	**Maximum diameter (MD) - mm**	**Height (H) - mm**	**Aperture height (AH) - mm**	**Height of maximum diameter (HMD) - mm**	**Relative Diameter (RD)**
***C. sumbawaensis* (15 specimens)**						
Range	57.65 – 85.20	19.37 – 31.75	17.66 – 28.62	42.12 – 67.86	39.38 – 64.59	0.44 - 0.50
Mean	70.88	24.86	22.49	53.35	50.60	0.47
***C. bengalensis* (16 specimens)**						
Range	92.04 – 110.90	28.02 – 35.98	25.45 – 31.75	67.82 – 80.78	64.40 – 77.06	0.39 - 0.45
Mean	99.86	31.78	28.59	76.44	72.12	0.42

Table 1. Morphometric parameters including SL, MD, H, AH, HMD, and RD for the adult specimens of *C. sumbawaensis*, and *C. bengalensis*.

Cylinder sumbawaensis is on average smaller than *C. bengalensis*, with a proportionately wider shoulder to spire length, the relative diameter of *C. sumbawaensis* being higher (mean RD of 0.47) than *C. bengalensis* (mean RD of 0.42) (Table 1).

Cylinder sumbawaensis has on average a slightly higher spire percentage to shell length (mean of 24.87%) than *C. bengalensis* (mean of 23.40%). The most significant parameter is the shell ratio factor, *C. sumbawaensis* has a mean of 2.71 and *C. bengalensis* a mean of 2.97 (Table 2).

	Relative position of the maximum diameter (PMD)	**Spire Height (SH) - mm**	**Relative Spire height (RSH)**	**Estimated 'model' volume (V)**	**Spire % of length (SP)**	**Shell ratio factor (SR)**
***C. sumbawaensis* (15 specimens)**						
Range	0.93 - 0.97	13.46 – 21.78	0.20 - 0.28	19.72 – 77.42	20.35 – 27.65	2.55 – 2.84
Mean	0.95	17.53	0.25	42.01	24.87	2.71
***C. bengalensis* (16 specimens)**						
Range	0.90 - 0.97	19.04 – 31.32	0.19 - 0.28	65.63 – 119.33	19.15 – 28.24	2.77 – 3.14
Mean	0.94	23.42	0.23	91.51	23.40	2.97

Table 2. Morphometric parameters including PMD, SH, RSH, V, SP, and the shell ratio factor (SR) for the adult specimens of *C. sumbawaensis* and *C. bengalensis*.

The relative diameter in relation to the relative position of the maximum diameter *C. sumbawaensis* fills a different plot area with a very different trend (Figure 4) than *C. bengalensis*.

The shell ratio factor in relation to the spire percentage to shell length, *C. sumbawaensis* fills a very different plot area with a very different trend (Figure 5) than *C. bengalensis*.

Cylinder sumbawaensis has, on average, a smaller shell with a slightly broader shoulder in relation to shell length. *Cylinder bengalensis* has very fine spiral striae around the outer whorl, the posterior half becoming smooth on the last whorl, the anterior half exhibiting faint fine spiral striae, whereas *C. sumbawaensis* has moderately fine spiral striae around the outer whorl, the posterior half faint spiral striae visible and the anterior half having stronger spiral striae on the outer whorl. *Cylinder sumbawaensis* has a straight body whorl whereas *C. bengalensis* is relatively straight, but slightly concave in the center. The spire of *C. bengalensis* is moderately stepped with a moderately straight outline, whereas *C. sumbawaensis* is much more stepped and has a straight outline. The shoulder of *C. sumbawaensis* is sharply angulate with a moderately broad profile, whereas *C. bengalensis* has a sub-angulate to angulate shoulder with a narrow profile. The color of the two species is very similar with regards to the banding, and *C. bengalensis* has a finer tent pattern, whereas *C. sumbawaensis* has a large tented pattern.

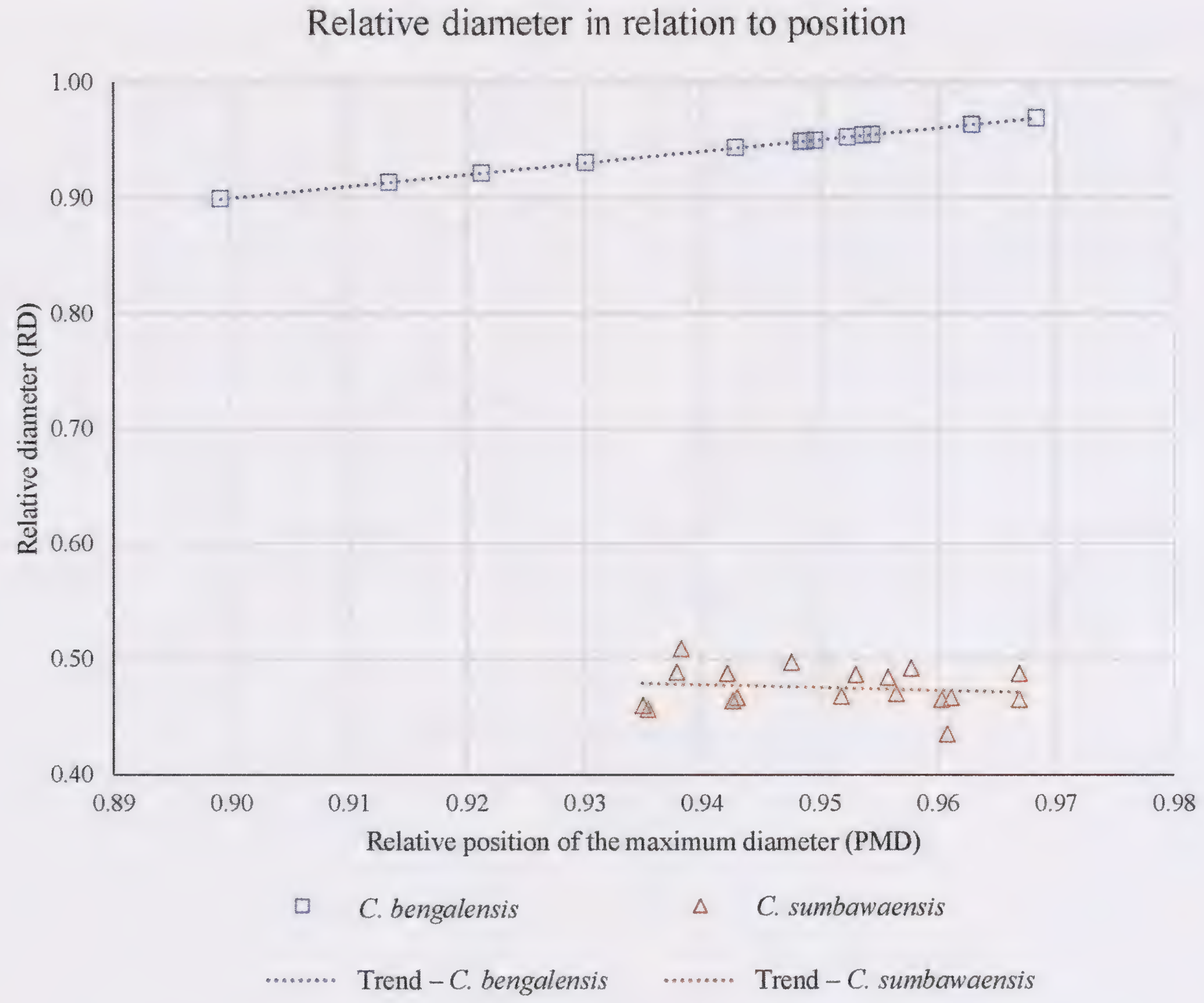

Figure 4. Plots of the relative diameter (RD) of the shell in relation to the relative position of the maximum diameter (PMD) for the adult specimens of *C. sumbawaensis*, and *C. bengalensis*.

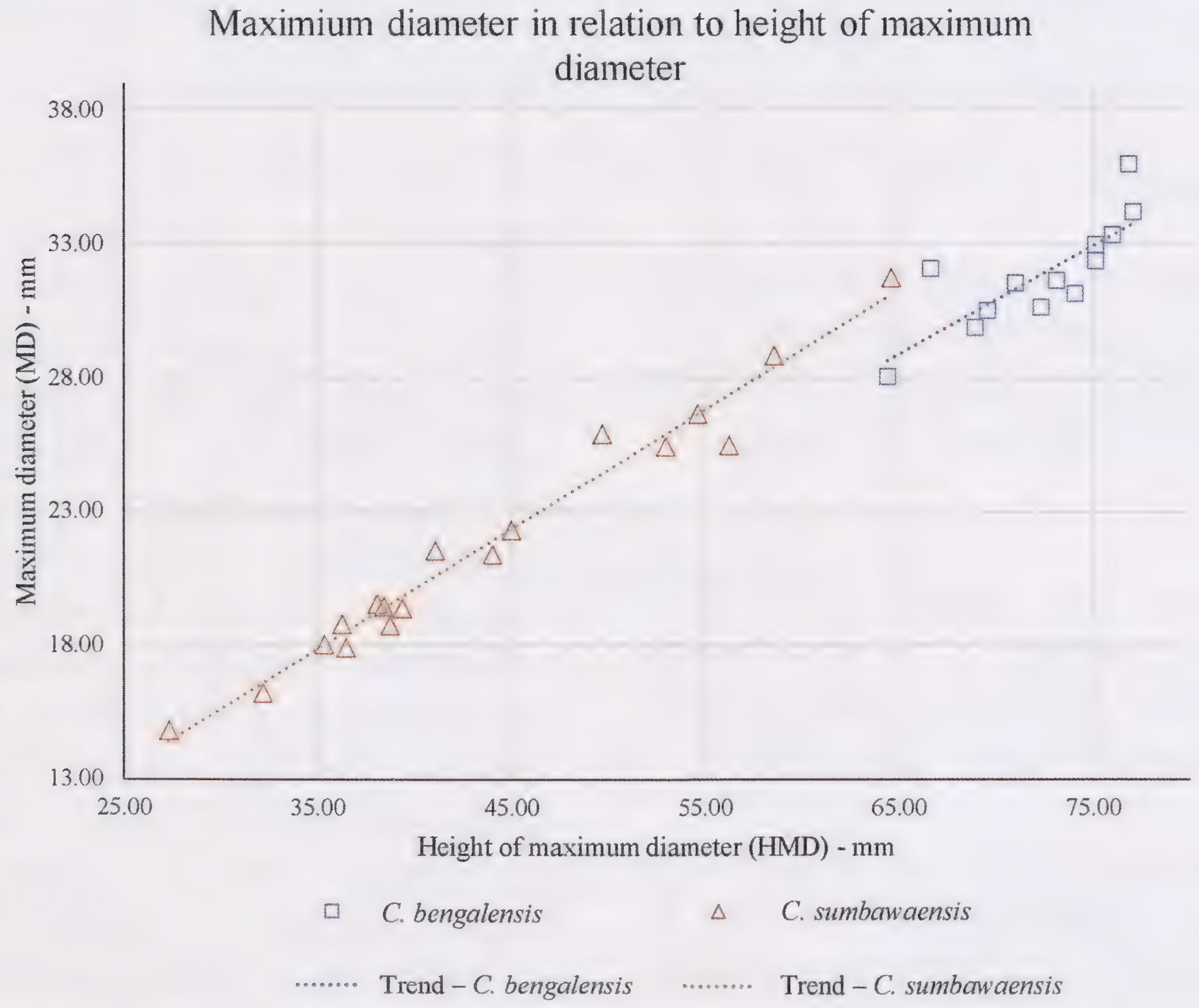

Figure 5. Plots of the shell ratio factor (SR) of the shell in relation to the spire as a percentage of shell length for the adult specimens of *C. sumbawaensis*, and *C. bengalensis*.

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LITERATURE CITED

Monnier, E., Limpalaër, L., Robin, A. & Roux, C. 2018. A Taxonomic Iconography of Living Conidae. 2 Volumes. Conchbooks, Arxheim, Germany. 1207 pp.

Monnier, E., Prugnaud, F. & Limpalaër, L. 2021. *Phasmoconus (Phasmoconus) chindeensis* sp. nov. (Gastropoda: Conidae), new species from Mozambique channel. Xenophora Taxonomy 31:3-24.

Okutani, T. 1968. A new cone form Gulf of Bengal, *Darioconus bengalensis*, n. sp. Venus, The Japanese Journal of Malacology 26(3-4):66-69.

Parsons, J., J. Abbas, & S. Lie. 2020. A new Subspecies of the *Eugeniconus nobilis* Complex from North-western Sumbawa Island, Indonesia. The Festivus 52:265-273. doi:10.54173/F523253

Petuch, E.J. 1982. Geographical Heterochrony: Contemporaneous co-existence of Neogene and Recent molluscan faunas in the Americas. Palaeogeography, Palaeoclimatology, and Paleoecology 37:277-312.

Petuch, E.J. and D.P. Berschauer. 2020. Tropical Marine Mollusks: An Illustrated Biogeographical Guide. CRC Press, London, New York, Boca Raton. 357 pp.

Röckel, D., Korn, W. & Kohn, A.J. 1995. Manual of the living Conidae. Verlag Christa Hemmen, Grillparzerstr, Germany. 517 pp.

Veldsman, S.G. 2022. Description of *Phasmoconus (Phasmoconus) nemo* n. sp. (Gastropoda: Conidae) from south-eastern Africa. The Festivus 54(2):82-100. doi:10:54173/F54282

Wisnu-Aji, H. 2016. Geology of Indonesia - indonesianstudiesbsj. https://indonesianstudiesbsj.wordpress.com/2016/01/21

Verbinnen, G. 2022. A new Cone (Conidae) from Sumbawa Island, Indonesia. Gloria Maris 61(2):112-115.

Zahirovic, S., M. Seton, R.D. Müller. 2014. The Cretaceous and Cenozoic tectonic evolution of Southeast Asia. Solid Earth 5:227-273. doi:10.5194/se-5-227-2014

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C. sumbawaensis, 68.50 mm x 25.90 mm, Teluk Saleh, Sumbawa Island, Indonesia, Berschauer Coll.
C. sumbawaensis, 80.47 mm x 25.57 mm, Teluk Saleh, Sumbawa Island, Indonesia, Petuch Coll.
C. sumbawaensis, 75.48 mm x 25.37 mm, Teluk Saleh, Sumbawa Island, Indonesia, Petuch Coll.
C. sumbawaensis, 83.92 x 28.84 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB01.
C. sumbawaensis, 85.20 x 31.75 mm,Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB02.
C. sumbawaensis, 71.63 x 25.90 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB03.
C. sumbawaensis, 75.23 x 25.49 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB04.
C. sumbawaensis, 73.10 x 25.44 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB05.
C. sumbawaensis, 78.35 x 26.66 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB06.
C. sumbawaensis, 64.60 x 22.28 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB07.
C. sumbawaensis, 59.25 x 21.38 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB08.
C. sumbawaensis, 59.82 x 21.52 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB09.
C. sumbawaensis, 57.65 x 19.37 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB12.
C. sumbawaensis, 54.47 x 19.45 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB10 (juv.).
C. sumbawaensis, 54.45 x 18.79 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB11 (juv.).
C. sumbawaensis, 55.90 x 19.55 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB13 (juv.).
C. sumbawaensis, 53.24 x 18.74 mm, Teluk Salehf, Sumbawa Island, Indonesia, Veldsman Coll. SVNB14 (juv.).
C. sumbawaensis, 51.05 x 17.91 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB15 (juv.).
C. sumbawaensis, 46.42 x 16.22 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB16 (juv.).
C. sumbawaensis, 53.52 x 18.03 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB17 (juv.).
C. sumbawaensis, 39.76 x 14.83 mm, Teluk Saleh, Sumbawa Island, Indonesia, Veldsman Coll. SVNB18 (juv.).

Appendix A. Measurements of individual *Cylinder sumbawaensis* specimens studied.

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Description of two new *Marginella* species (Gastropoda:Marginellidae), from the KwaZulu-Natal and Eastern Cape, South Africa

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ABSTRACT Two new species in the genus *Marginella* from KwaZulu-Natal and the Eastern Cape, South Africa, are described. The first, *Marginella (Nataliamarginella) praeacuta* n. sp. is described from Hole in the Wall and Coffee Bay, northern Eastern Cape, South Africa, and compared to *M. (N.) mtataensis* from the same area, and *M. (N.) wallaceorum* from southern KwaZulu-Natal. The second, *Marginella (Albamarginella) humeronotata* n. sp. is described off southern KwaZulu-Natal, South Africa, and compared to *M. (A.) bicatenata* from the same area, and *M. (A.) tomlini* from the Agulhas Bank.

KEYWORDS *Marginella, Albamarginella, Nataliamarginella, M. (N.) praeacuta, M. (N.) humeronotata,* Marginellidae, KwaZulu-Natal, Eastern Cape, South Africa

INTRODUCTION

Several new species are discovered yearly by dredging in new areas along the South African coast, along with comparing data from the old research programmes conducted by the Natal Museum, Pietermaritzburg, during the 1980s. Two new species were discovered amongst the vast number of specimens studied. The first is a small shell classified in the *Nataliamarginella* S.G. Veldsman, 2017 subgenus that compares to *Marginella (Nataliamarginella) mtataensis* S.G. Veldsman, 2021 from the same locality range, northern Eastern Cape (Figure 1). *Marginella (N.) mtataensis* from the Eastern Cape was described by Veldsman (2021) as a small species that is ovate-biconical in shape and compared to *Marginella (Nataliamarginella) wallaceorum* Lussi, 2013 from KwaZulu-Natal.

The second, is a small shell in the subgenus *Albamarginella* S.G. Veldsman, 2017 that in many instances was identified as *Marginella (Albamarginella) bicatenata* Sowerby III, 1914, from southern KwaZulu-Natal (Figure 1), but was found to be morphologically different. Wakefield (2012) indicated the type locality of *M. (A.) bicatenata,* allocated by Sowerby (1914), was Gorée, Senegal, and decided it is an error. The authors agree with Wakefield (2012) that the type locality of *M. (A.) bicatenata* is southern KwaZulu-Natal, South Africa and not Senegal, and the holotype concurs with specimens dredged south of Durban to Amanzimtoti, southern KwaZulu-Natal (Figure 1). For a while in the past authors synonymized *M. (A.) tomlini* Shackleford, 1916, with *M. (A.) bicatenata,* but Shackleford (1916) described a much larger shell from the Agulhas Bank, that is clearly different from *M. (A.) bicatenata.*

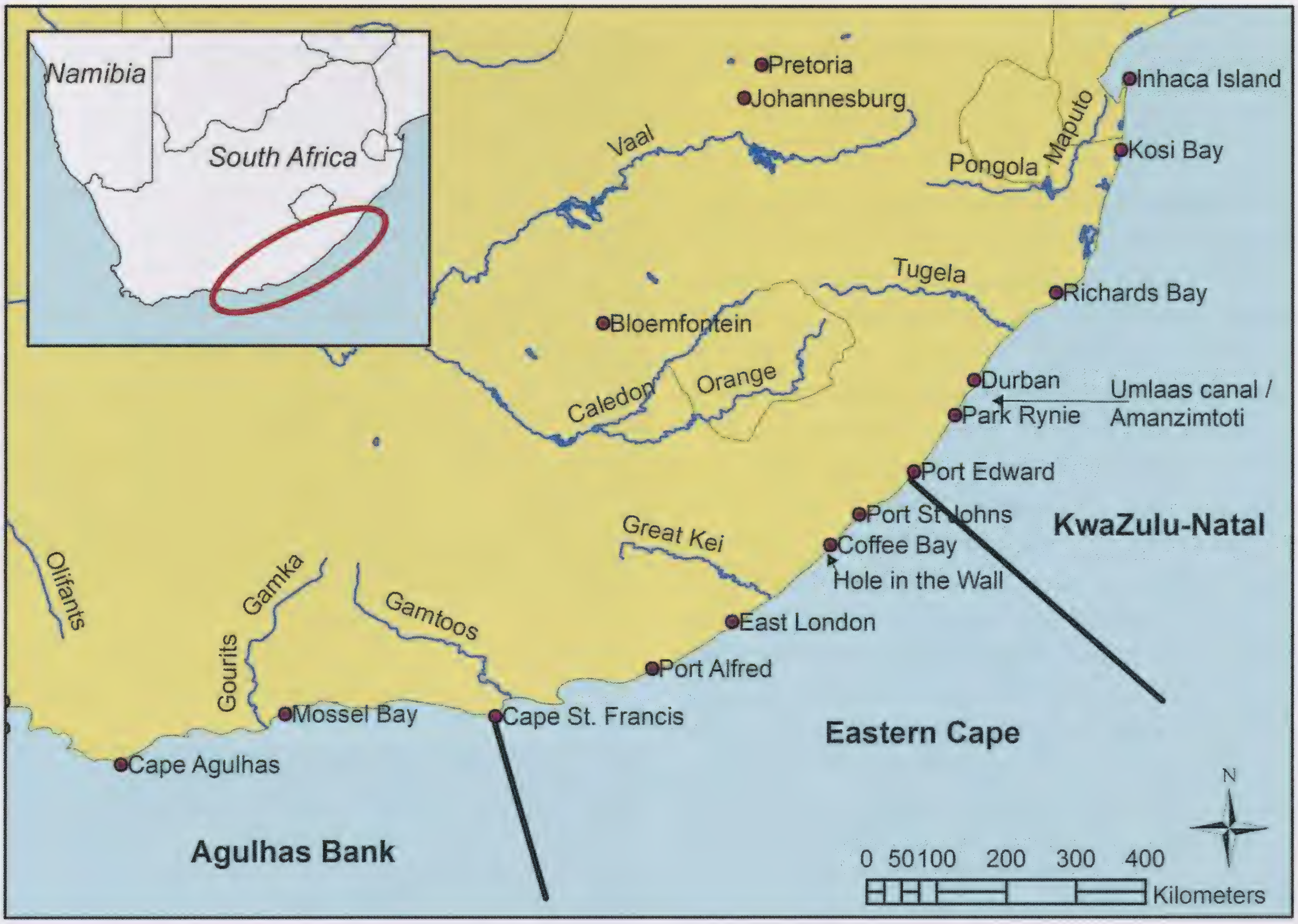

Figure 1. Locality map indicating the regions where the two new species occur.

METHODS

Marginella species within the same subgenus share several taxonomic characters, such as the type of labial denticles, posterior notch and callus on columella. Other shell morphological features are used here to differentiate species from each other, but not limited to, such as the shoulder shape and width, general shape of the shell, spire height and characteristics, aperture shape and width, shape of the labrum, markings, coloration and striae on body whorl.

Shells were measured with a pair of digital calipers (RS Pro Electronic Digital Caliper 150mm/6", South Africa). To ensure precision, each measurement was taken in triplicate. All the type material of the new species and other material studied were photographed by S.G. Veldsman.

SYSTEMATICS

Phylum Mollusca Linnaeus,1758
Class Gastropoda Cuvier, 1795
Subclass Caenogastropoda Cox, 1960
Order Neogastropoda Wenz, 1938
Superfamily Volutoidea Rafinesque, 1815
Family Marginellidae Fleming, 1828
Genus *Marginella* Lamarck, 1799
Subgenus *Albamarginella* S.G.Veldsman, 2017
Subgenus *Nataliamarginella* S.G.Veldsman, 2017

Marginella (Nataliamarginella) praeacuta
S.G.Veldsman & R.Aiken, n. sp.
(Figure 6.1, 6.2, 6.3 & 6.5)

Description. The shell is small (10-13 mm), fusiform-biconical shaped, has a low, sharp angled shoulder. Moderately thick labrum, smooth and off-white background color with dark brown markings on top, with no posterior notch or labial denticles. Spire moderately high and moderately broad, spire whorls convex and slightly stepped. Wide protoconch, light grey color. Columella straight with four thick continuous plications, which take up half the length of the aperture, off-white color. Callus developed on the columella. Aperture moderately wide and straight, off-white color. Background of the body whorl off-white to creamy colored, with brown speckled pattern presented in thin bands around the body whorl. The thin speckled lines become lighter colored towards the last third of the body whorl at anterior side, presented as a wide band, followed by thin band of dark brown lines visible around the body whorl. The last portion towards the base of the shell have similar speckled bands than that of the first two thirds of the shell. The shoulder has a thin darker speckled band presented as larger blocks. The spire has slightly darker brown speckled bands.

Distribution. Type locality of *M. (N.) praeacuta* n. sp. is dredged 110 m off Hole in the Wall, approx. 7 km south-west of Coffee Bay, Eastern Cape, South Africa. Specimens were dredged 100-110 m off Hole in the Wall and Coffee Bay, Eastern Cape.

Type material. The type material of the holotype and paratypes of *M. (N.) praeacuta* are as follows:

Holotype: 12.01 x 6.41 mm (Figure 6.1); off Hole in the Wall, dredged 110m; Coll. Natal Museum South Africa (NMSA), ID No: P2001/T4559 (Donated by R. Aiken).
Paratype 1: 11.94 x 6.52 mm (Figure 6.2); off Hole in the Wall, dredged 110m; Aiken Coll.
Paratype 2: 12.23 x 6.66 mm; off Coffee Bay, dredged 100m; Veldsman Coll.
Paratype 3: 12.40 x 6.95 mm (Figure 6.3); off Hole in the Wall, dredged 110 m; Aiken Coll.
Paratype 4: 12.08 x 6.75 mm (Figure 6.5); off Hole in the Wall, dredged 110 m; Veldsman Coll.
Paratype 5: 11.61 x 6.67 mm; off Coffee Bay, dredged 100 m; Aiken Coll.
Paratype 6: 11.42 x 6.37 mm; off Hole in the Wall, dredged 110 m; Aiken Coll.

Etymology. The name '*praeacuta*' refers to the shell sharpening at one end (anterior side).

Discussion. *Marginella (N.) praeacuta* n. sp. is closely related and very similar in size to *M. (N.) mtataensis* S.G.Veldsman, 2021 (Figure 2) and *M. (N.) wallaceorum* Lussi, 2013 (Figure 3). *Marginella (N.) mtataensis* is much more ovate in shape than *M. (N.) praeacuta* that is more fusiform ending sharper edged at the anterior side, whereas *M. (N.) wallaceorum* is even more ovate. *Marginella (N.) praeacuta* has a higher and sharper spire than *M. (N.) mtataensis* and *M. (N). wallaceorum* that have shorter wider spires. *Marginella (N.) praeacuta* has a wider and straighter aperture than the other two species, and its lip is on average thinner.

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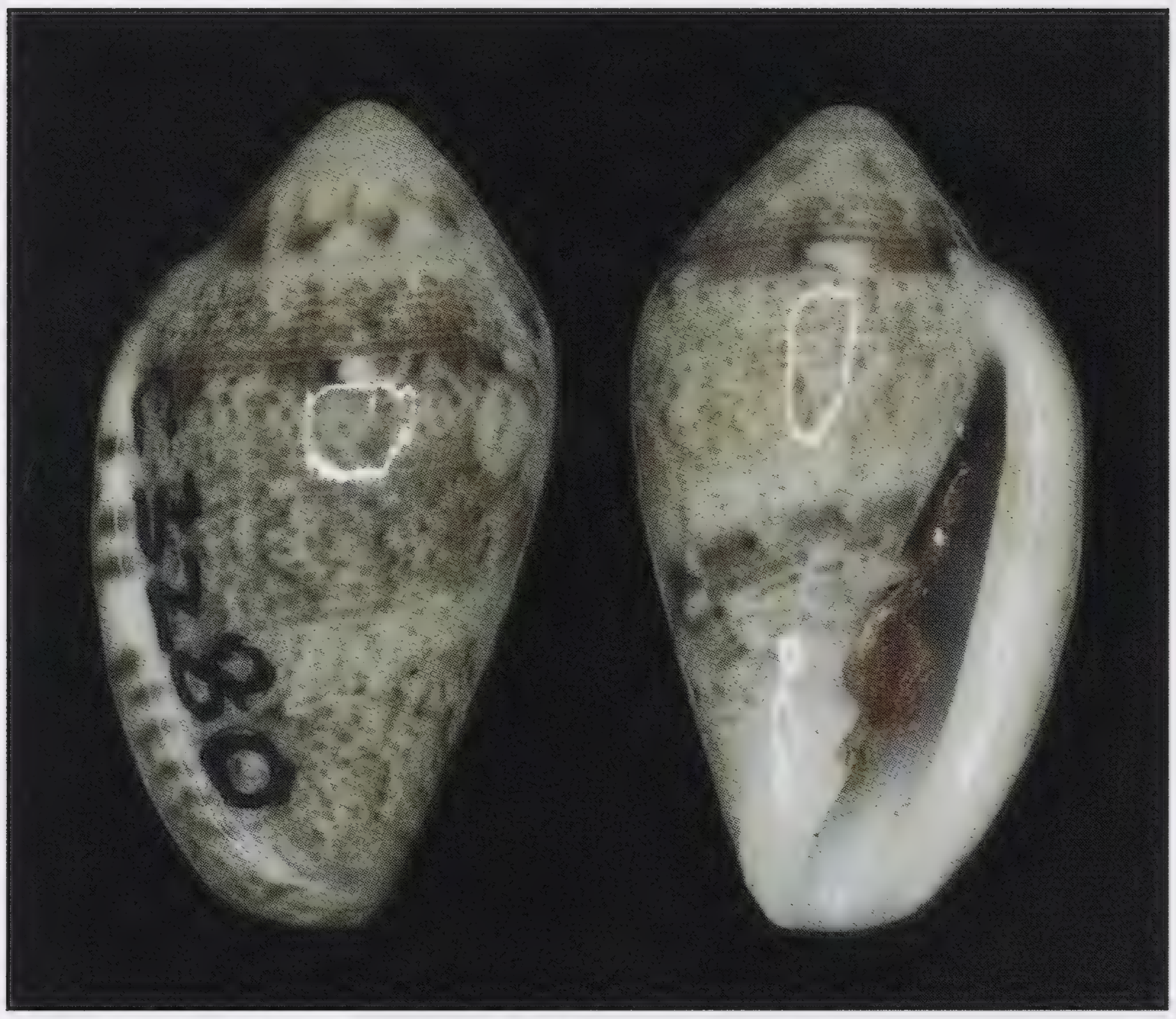

Figure 2. Holotype of *Marginella (Nataliamarginella) mtataensis* (10.68 x 5.85 mm), dredged 135-165m off Ubombo, approx. 19 km north-east of Coffee Bay, northern Eastern Cape. NMSA C3280/T4454, photo taken by S.G. Veldsman.

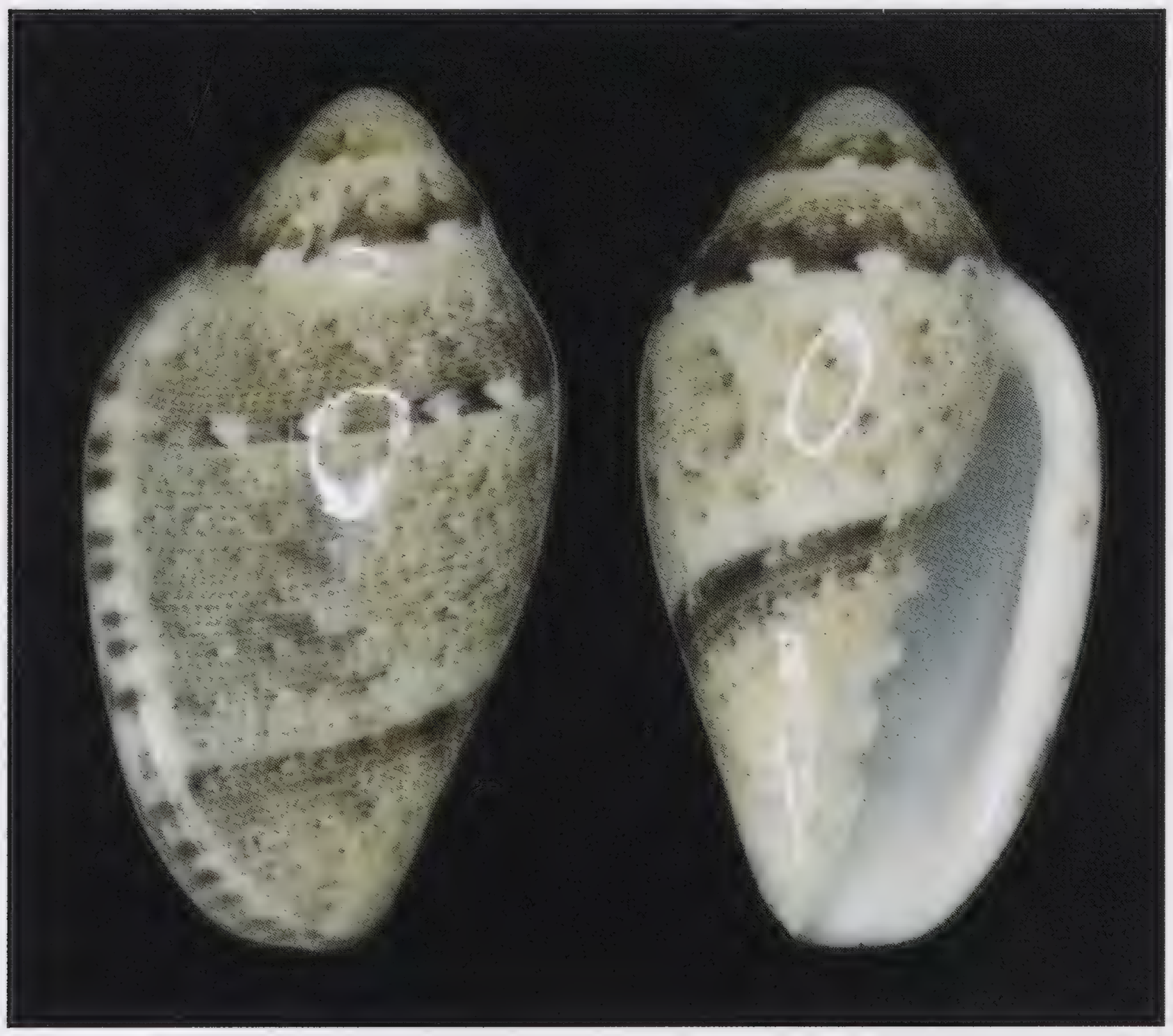

Figure 3. Holotype of *Marginella (Nataliamarginella) wallaceorum* (11.53 x 6.19 mm), dredged 125m off Port Edward, southern KwaZulu-Natal. NMSA W9482/T3159, photo taken by S.G. Veldsman.

Marginella (Albamarginella) humeronotata
S.G.Veldsman & R.Aiken, n. sp.
(Figure 7.1, 7.2 & 7.3)

Description. The shell is small (11-13 mm), light-weight and biconical-oval in shape. Spire low in relation to shell length and aperture, moderately stepped and slightly convex with the spirals being rounded. Shoulder is wide and rounded. Body whorl wide at posterior side, rounded, narrowing at a slight angle towards anterior side. Labrum is moderately thick, lip straight. No labial denticles present, posterior labial notch is slightly developed. Four columellar plications placed at equal intervals, the third and fourth (lower plicae) towards the anterior side at an angle with the fourth ending directly at the siphonal canal. Plicae off-white color, callus covering all the plicae and inside of columella. Moderately wide aperture and straight, columella straight. Aperture off-white colored. Background color of dorsum of the body whorl and spire off-white. Dark brown to black spots, widely spaced in one line around shoulder. The spire and protoconch off-white in color.

Distribution. Type locality of *M. (A.) humeronotata* n. sp. is dredged 160-170 m off Amanzimtoti, KwaZulu-Natal, South Africa. All specimens studied occur in deep water ranging from 100-170 m southern KwaZulu-Natal.

Type material. The type material of the holotype and paratypes of *M. (A.) humeronotata* are as follows:

Holotype:	12.03 x 7.03 mm (Figure 7.1); off Amanzimtoti (30°06.40'S & 31°00.80'E), southern KwaZulu-Natal, dredged 160-170 m, 1985; Coll. Natal Museum South Africa (NMSA), ID No: D1496/T4556.

Paratype 1: 12.92 x 7.45 mm (Figure 7.2); off Park Rynie, southern KwaZulu-Natal, dredged 100 m; Aiken Coll.

Paratype 2: 11.09 x 6.64 mm (Figure 7.3); Umlaas Canal (30°01.10'S & 31°03.20'E), dredged 150 m, 1985; Coll. NMSA: D800/T4557.

Paratype 3: 13.85 x 8.26 mm; off Amanzimtoti (30°06.40'S & 31°00.80'E), southern KwaZulu-Natal, dredged 160-170m, 1985; Coll. Natal Museum South Africa (NMSA), ID No: P2000/T4558.

Etymology. The name '*humeronotata*' refers to the markings on the shoulder.

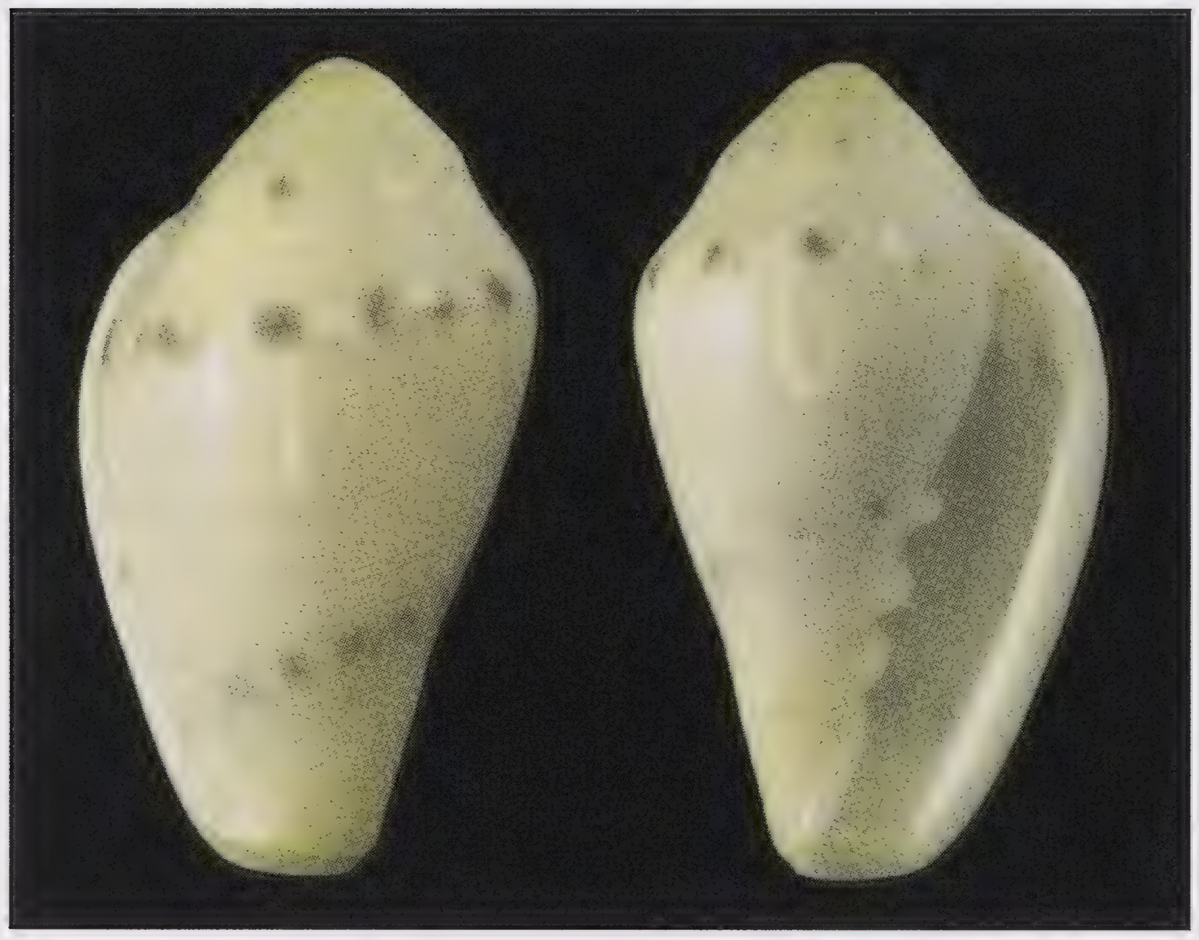

Figure 4. Holotype of *Marginella bicatenata* (13.00 x 7.00 mm) southern KwaZulu-Natal. National Museum Wales (NMW) Tom. Coll. 1955.158.01434, photo with courtesy of Amgueddfa Cymru — NMW, Department of Natural Sciences.

Discussion. *Marginella (A.) humeronotata* n. sp. compare with *M. (A.) bicatenata* Sowerby III, 1914 (Figure 4) and *M. (A.) tomlini* Shackleford, 1916 (Figure 5). *Marginella (A.) tomlini* is larger in size and differs in general shape than the other two species. Furthermore, *M. (A.) tomlini* is biogeographically separated from the other two KwaZulu-Natal species that it occurs only on the Agulhas Bank (Figure 1) more than 700km apart. *Marginella (A.) humeronotata* n. sp. is more oval shaped with a wider body whorl on the posterior side and center, only angling slightly towards the anterior side, whereas *M. (A.) bicatenata* is only wide at the posterior end, narrowing at the center, angling sharply towards the anterior end. *Marginella (A.) bicatenata* has a thinner more rounded lip than *M. (A.) humeronotata* n. sp. that has a thicker and straighter lip. *Marginella (A.) humeronotata* n. sp. has only one line of spots around the shoulder, whereas *M. (A.) bicat*

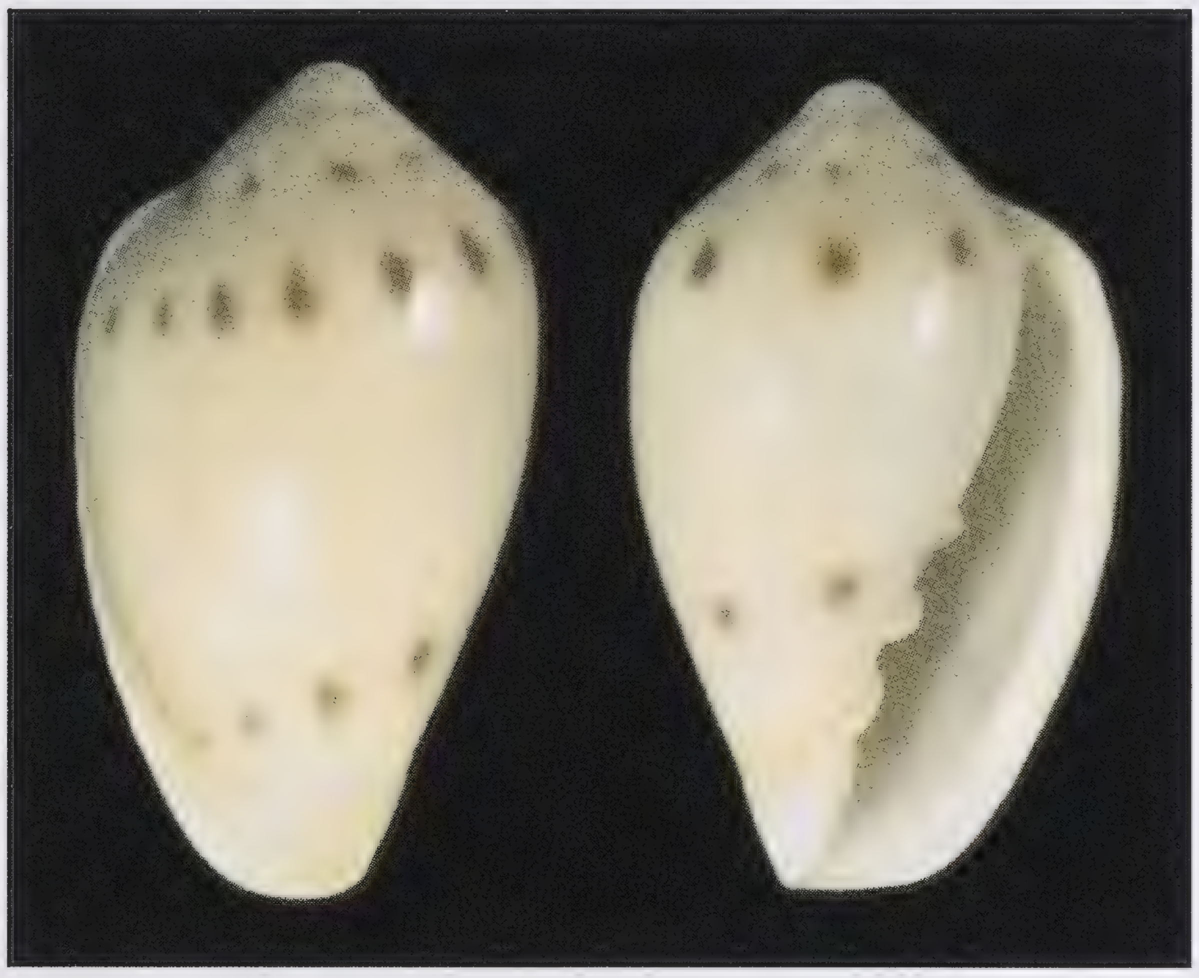

Figure 5. Holotype of *Marginella tomlini* (18.00 x 9.00 mm) trawled 105 fathoms off Cape St. Blaize, Agulhas Bank. Iziko Museum of South Africa (SAM) A37047, photo with courtesy of Albe Bosman, Collections Manager, Ichthyology, Natural History, Iziko Museum of South Africa.

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LITERATURE CITED

Shackleford, L.J. 1916. Two new species of *Marginella* from South Africa. Annals of the South African Museum 9:193-194.

Sowerby, G.B. III. 1914. Descriptions of new Mollusca from New Caledonia, Japan, Philippines, China and West Africa. The Annals and Magazine of Natural History, ser. 8, 14(84):475-480.

Veldsman, S.G. 2021. Description of four new *Nataliamarginella* and one *Punctamarginella* species (Marginellidae: *Marginella*), from the Eastern Cape, South Africa. The Festivus 53(3):210-222.

Wakefield, A. 2012. A review of the *Marginella bicatenata* Sowerby, 1914 complex (Gastropoda: Marginellidae) with the description of new southeast African *Marginella* species. Novapex 13(2):69-74.

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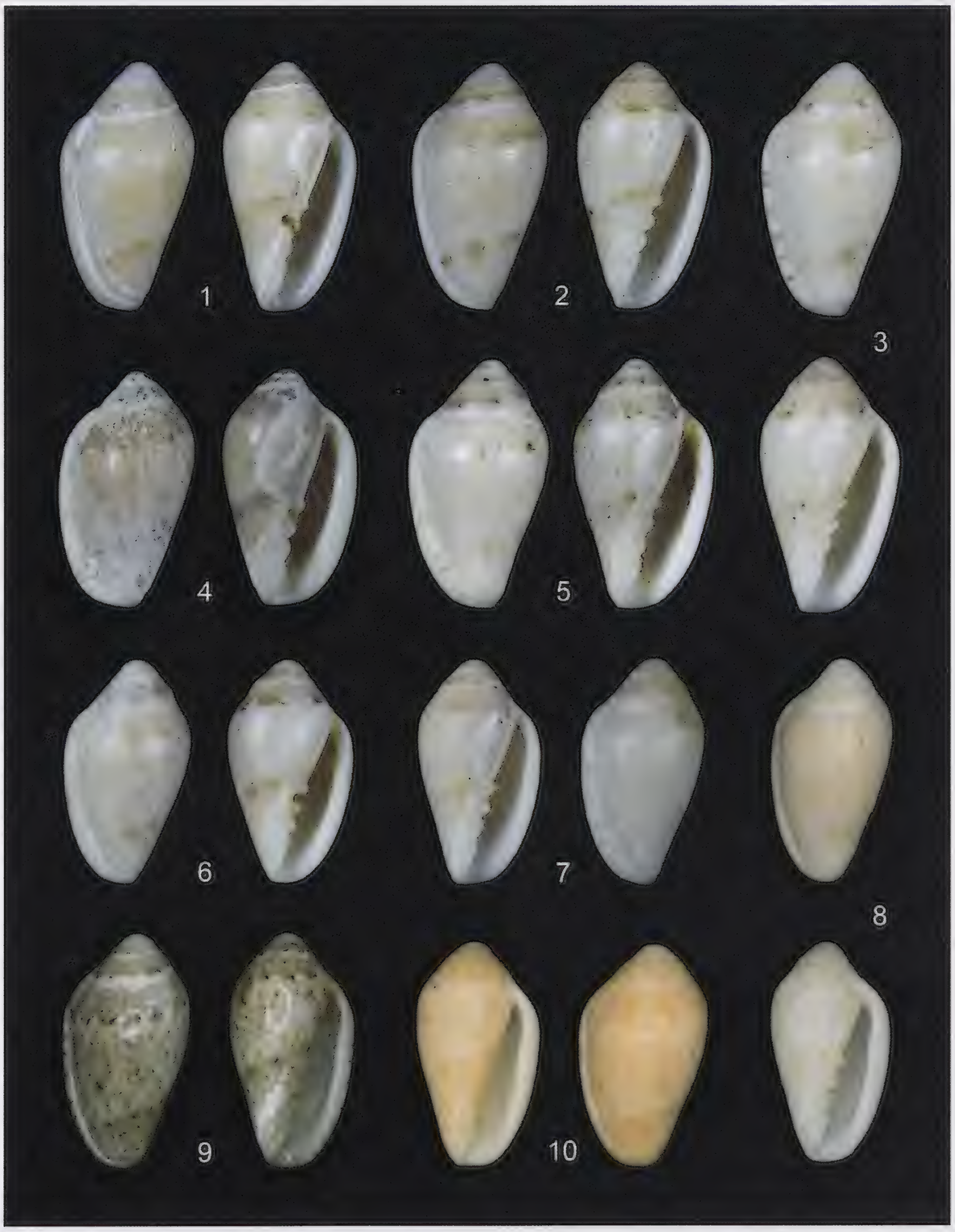

Figure 6. 1= *M. (N.) praeacuta* (12.01 x 6.41 mm) – Holotype; off Hole in the Wall, dredged 110 m; Coll. NMSA (P2001/T4559). **2=** *M. (N.) praeacuta* (11.94 x 6.52 mm) – Paratype 1; off Hole in the Wall, dredged 110 m; Aiken Coll. **3=** *M. (N.) praeacuta* (12.40 x 6.95 mm) – Paratype 3; off Hole in the Wall, dredged 110 m; Aiken Coll. **4=** *M. (N.) mtataensis* (11.37 x 6.31 mm) – off Coffee Bay, dredged 100 m; Aiken Coll. **5=** *M. (N.) praeacuta* (12.08 x 6.75 mm) – Paratype 4; off Hole in the Wall, dredged 110 m; Aiken Coll. **6=** *M. (N.) mtataensis* (10.88 x 6.05 mm) – off Hole in the Wall, dredged 110 m; Aiken Coll. **7=** *M. (N.) mtataensis* (10.95 x 5.97 mm) – off Hole in the Wall, dredged 110 m; Aiken Coll. **8=** *M. (N.) wallaceorum* (10.23 x 5.67 mm); off Park Rynie, KZN, dredged 100 m; Veldsman Collection. **9=** *M. (N.) wallaceorum* (10.81 x 5.91 mm); off Pumula, KZN, dredged 100 m; Veldsman Collection. **10=** *M. (N.) wallaceorum* (10.61 x 5.93 mm); Park Rynie, KZN, dredged 100 m; Veldsman Collection.

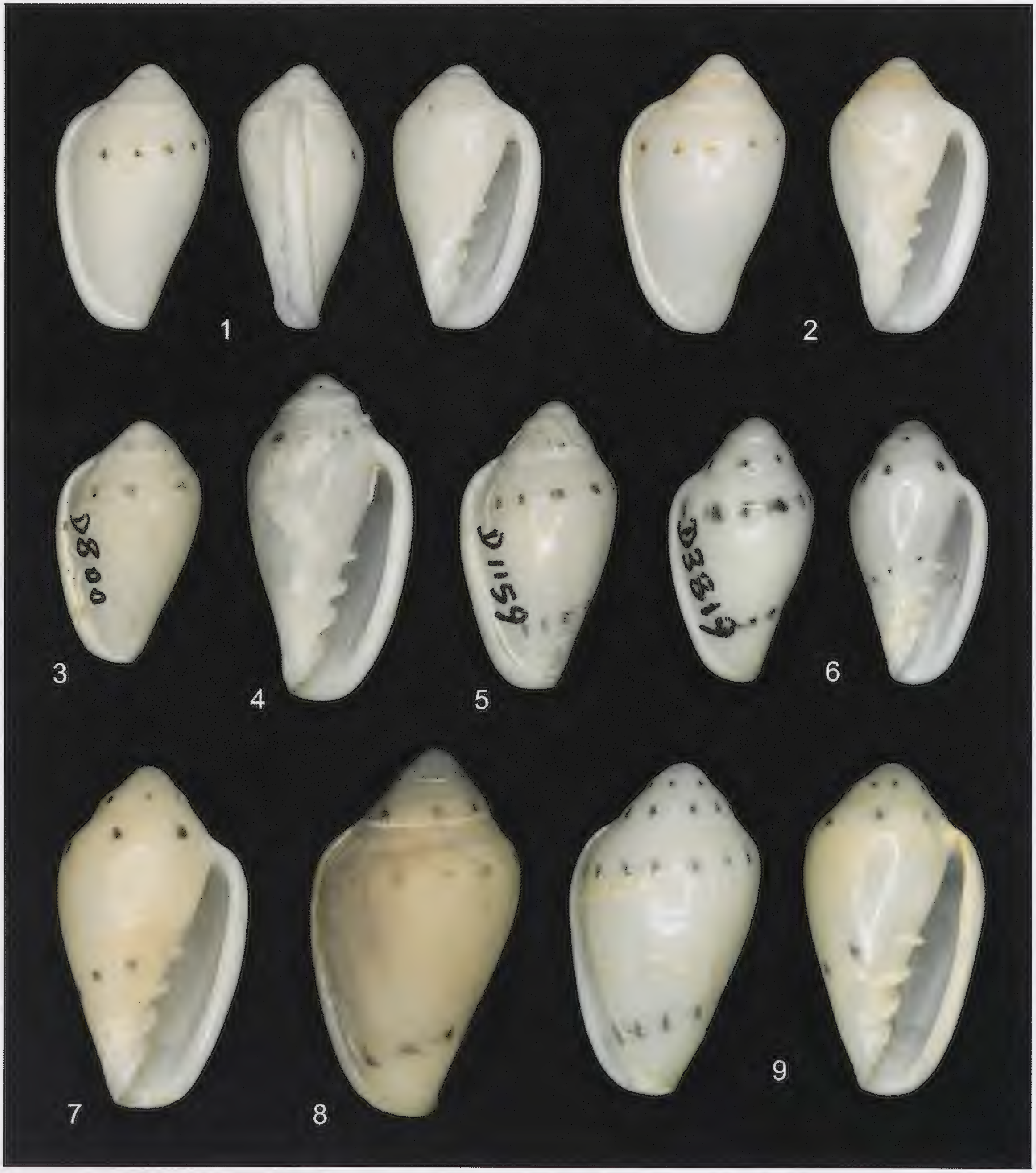

Figure 7. 1= *M. (A.) humeronotata* (12.03 x 7.03 mm) – Holotype; off Amanzimtoti, dredged 160-170 m; Coll. NMSA (D1496/T4556). **2**= *M. (A.) humeronotata* (12.92 x 7.45 mm) – Paratype 1; off Park Rynie, dredged 100 m; Aiken Coll. **3**= *M. (A.) humeronotata* (11.09 x 8.26 mm) – Paratype 2; Umlaas Canal, dredged 150 m; Coll. NMSA (D800/T4557). **4**= *M. (A.) bicatenata* (14.56 x 6.64 mm); Umlaas Canal, dredged 100 m; Coll. NMSA (D1094). **5**= *M. (A.) bicatenata* (13.02 x 7.30 mm); Umlaas Canal, dredged 150 m; Coll. NMSA (D1159). **6**= *M. (A.) bicatenata* (11.97 x 6.75 mm); off Durban, dredged 110-120 m; Coll. NMSA (D3819). **7**= *M. (A.) tomlini* (15.59 x 8.66 mm); off Mossel Bay, trawled 100-150 m; Aiken Coll. **8**= *M. (A.) tomlini* (17.50 x 9.65 mm); off Mossel Bay, trawled 100-150 m; Aiken Coll. **9.** *M. (A.) tomlini* (15.16 x 8.82 mm); off Cape Agulhas, trawled; Coll. NMSA (D506).

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Four New Deep-Sea Whelks From the North American Pacific Coast (Neogastropoda: Buccinidae)

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ABSTRACT Four new species of buccinoid gastropods from the continental shelf and slope are described. *Neptunea flatteryensis* Clark, n. sp. and *Latisipho ritteri* Clark, n. sp. from depths of 134-165 m off the Cape Flattery area of Washington State, *Buccinum cascadiense* Clark, n. sp. found at bathyal depths of 788-1203 m, off of the coasts of Washington and Oregon, and *Golikovia fitchi* Clark, n. sp. found at bathyal depths of 722-1240 m off of California.

KEY WORDS Mollusks, Bathyal, *Neptunea, Golikovia, Latisipho, Buccinum,* Buccinidae.

INTRODUCTION

The neogastropod fauna of the continental shelf and slope off the Pacific coast of North America has been poorly studied. One new species was recently described from the region (Clark, 2019). The present report describes four new species taken during trawling operations (from 1990-2004). *Neptunea flatteryensis* Clark, n. sp. and *Latisipho ritteri* Clark, n. sp., were taken by commercial trawlers working out of Astoria, Oregon from 1990-2000, and obtained by Mr. William J. Ritter of Astoria, Oregon. *Golikovia fitchi* Clark, n. sp. and *Buccinum cascadiense* Clark, n. sp., were collected by the author during NOAA/NMFS surveys carried out from 1997-2004. The collections of the Natural History Museum of Los Angeles County, and the Santa Barbara Museum of Natural History were also examined, as well as the unpublished notes of the late Dr. James H. McLean.

ABBREVIATIONS

LACM	Natural History Museum of Los Angeles County
SBMNH	Santa Barbara Museum of Natural History
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service (Alaska Fisheries Science Center).
OD	Original designation
RNC	Reference collection of the author
SD	Subsequent designation

SYSTEMATICS

Buccinidae Rafinesque, 1815
Subfamily. Buccininae Rafinesque, 1815
Genus. *Buccinum* Linnaeus, 1758
Type species. *Buccinum undatum* Linnaeus, 1758. (SD)

Buccinum cascadiense Clark, n. sp.
(Figures 1-2)

Description. Shell of moderate size, profile ovoid, inflated, height to 62.5 mm (RNC 4372), Holotype 45.9 x 26.3 mm; apex eroded, whorls rounded, suture moderately impressed; axial sculpture lacking; spiral sculpture of incised striae; final lip not thickened nor inflated. Color white, periostracum thin, pale yellow-green to light brown. Operculum of moderate size, not filling aperture, nucleus subcentral.

Type locality. West of Yaquina Head Light (44° 35.9' N, 124° 56.4' W), 800 m. R/V *Yaquina* (sta. OTB 256), 15 July1968.

Type material. Holotype LACM 3787 (ex LACM 68-216.7), and 10 Paratypes: 8, LACM 3788; 2, SBMNH 184002 (ex –LACM 68-216.7).

Additional material. 62, LACM 68-216.7, Topotypes; 3, LACM 152874, SW of Cape Foul weather, Lincoln Co., Oregon (44º36 N, 125º10 W), 1220 m; 4, LACM 90-347, W of Stone lagoon, Humboldt Co., California (41º16.0 N, 124º43.0 W), 1140 m; 2, RNC 3895, 42.9-54.4 mm, W of La Push, Clallam Co., Washington (47º35.7 N, 125º30.4 W), 1203 m (NMFS 21-1996-15-22); 3, RNC 4372, 42.3-62.5 mm, NW of Winchester Bay, Douglas Co., Oregon (43º58.3 N, 125º00.9 W), 828 m (NMFS 21-1999-13-131); 4, RNC 4373, 41.8-48.8 mm, WSW of Newport, Lincoln Co., Oregon (44º23.1 N, 125º02.5 W), 788 m (NMFS 21-1999-13-137); 3, RNC 3943, 42.9-56.3 mm, W of Florence, Lane Co. Oregon (43º45.4 N, 125º01.5 W), 865 m (NMFS 21-1996-15-171).

Distribution. Off the U.S. Pacific Northwest, from off La Push, Clallam Co., Washington (47º35 N) to off Stone lagoon, Humboldt Co., California (41º16 N).

Habitat. Bathyal depths, 788-1203 m, on green mud.

Etymology. Named for the Cascadia Biogeographical region.

Remarks. Similar to *Buccinum viridum* (Dall, 1890) (Figures 3-4), but lacks the shoulder carination of that species. The two species are seldom found together. *Buccinum cascadiense* is also somewhat larger than *B. viridum,* reaching a height of 62 mm, as opposed to around 52 mm for *B. viridum. Buccinum viridum* was placed in the subgenus *Viridibuccinum* Golikov & Sirenko, 1988.

Subfamily: Neptuneinae Stimpson, 1865
Genus: *Latisipho* Dall, 1916.
Type species. *Chrysodomus hypolispus* Dall, 1891: (OD)

Latisipho ritteri Clark, n. sp.
(Figures 5-6)

Description. Shell of moderate size, height to 5 cm (Holotype 40.0 mm x 15.0 mm) robust, profile slender, fusiform, aperture much less than half the length of shell, apex eroded; final whorl diameter decreasing, producing slightly convex general outline; whorls rounded, suture impressed, spiral cords low, broad, separated by sharp incisions, cords more broadly spaced at base of shell; aperture slanted; color white, periostracum dark brown. Radula: rachidian tooth with three, subequal denticles, lateral teeth L-shaped, distal portion forming a single large denticle, proximal portion bearing 2-3 small denticles.

Type locality. WSW of Cape Flattery, Clallam Co., Washington (48° 25' N, 125° 12' W), trawled, 146-165 m. 14 October, 1993. Ex – William J. Ritter.

Type material. Holotype, LACM 3780. 5 Paratypes: 2 LACM 3781; 1, SBMNH 184003; 1, RNC, 4129; 1, William Ritter collection.

Additional material. 1, USNM 678543, “Tahwit Head”, Washington; William Ritter

Collection: 2, topotypes; 2 off Destruction Island, Jefferson Co., Washington, 155-173 m; 2 S of Gray's submarine canyon, W of Gray's Harbor Co., Washington; 2, Juan de Fuca Strait, Clallam Co., Washington, 109 m.

Distribution. Known so far only from the vicinity of Cape Flattery, Clallam Co., Washington.

Habitat. Sublittoral depths, 146-173 m, on muddy substrates.

Etymology. It is my honor to name this species for the late Mr. William J. Ritter, of Astoria, Oregon, who acquired the type and reference material, in recognition of his many years of collection and study of Pacific Northwest mollusks.

Remarks. Dall (1921: 95) extended the range of the Japanese species *Colus adonis* Dall, 1919 [= *Kanamaura adonis* (now placed in the family Colubrariidae Dall, 1904)] to the eastern Pacific [Straits of Fuca to San Diego], based on specimens of this species, but it is quite different. *Latisipho ritteri* differs in (1) more slender shell, (2) shorter, broader canal, (3) more numerous and coarser spiral cords, (4) shorter aperture, which lacks the posterior constriction.

Genus: *Neptunea* Röding, 1798
Type species. *Murex antiquus* Linnaeus, 1758, (by SD of Cossmann, 1901: 99)

Neptunea flatteryensis Clark, n. sp.
(Figure 7)

Description. Shell large, to 137 x 89.1 mm (holotype), apex missing; shell pyriform, moderately broad; suture impressed; aperture a little more than one half of shell height; axial sculpture absent; spiral sculpture of one strongly projecting carination low on early whorls, uppermost cord forming shoulder angulation in early whorls, whorls becoming fully rounded in mature stage; mature sculpture with additional narrow, broadly separated primary cords, interspaces with numerous fine secondary cords; final lip flaring. Color cream-white, with cream to pale yellow aperture; periostracum apparently lacking.

Type locality. West of Cape Flattery, Clallam Co., Washington (approx. 48°25 N); trawled, 155 m; 12 July, 1992. Ex – William J. Ritter.

Type material. Holotype, LACM 3790.

Additional material. 2, RNC 4544, topotypes; 2, LACM 150561, "Washington State" ex— Kanakoff collection; 1, LACM 54715, off La Push, Clallam Co., Washington, 270 m.

Distribution. Known so far only from off the vicinity of Cape Flattery, Clallam Co., Washington.

Habitat. Found on muddy substrates, at depths of 137-270 m.

Etymology. Named for the type locality, Cape Flattery, Clallam Co., Washington; a Latin feminine singular adjective in the nominative case.

Remarks. This species differs from the more northern *N. pribiloffensis* (Dall, 1919) (Figure 8) in not having a persistent, angulate shoulder cord in the final whorls, and also in having fainter, less numerous primary cords. *Neptunea flatteryensis* also resembles *N. humboldtiana* A. G. Smith, 1971 (Figure 9) which occurs in the same region, but differs in (1) the much thicker shell 2.8-3.1 mm compared to 1.5-1.8 mm, (2) less inflated whorls, and (3) more prominent spiral sculpture, which is very faint in *H.*

humboldtiana. It also lacks the broadly flaring lip, and the badly eroded apices always present in *N. humboldtiana.*

Genus: *Golikovia* Habe & Sato, 1973
Type species. (OD): *Neptunea fukuae* Kira, 1959. Japan.

Golikovia fitchi Clark, n. sp.
(Figures 10-11)

Description. Shell of moderate size (height to 84 mm), Holotype 55.4 x 33.7 mm, broadly fusiform, protoconch eroded; sub-oval, aperture greater the half of shell height; profile rounded, except for subsutural concavity, suture moderately impressed; axial sculpture absent, accept growth lines; spiral sculpture lacking, canal short, broad, twisted; color pale grayish brown to white, periostracum lacking.

Type locality. West of San Miguel Island, California Channel Ids., California (34º06 N, 120º42 W), 722 m (*leg.* J. S. Muroaka, date unknown).

Type Material. Holotype LACM 3670 (ex LACM 151762), 55.4 mm. Paratypes: 1, LACM 3671 (ex LACM 34782) 14.5 km S of San Clemente Island, California (approx. 32º40 N, 118º25 W), 74.4 mm; 1, SBMNH 184004, SW of Eureka, Humboldt Co., California (40º30.5 N, 124º26.7 W), trawled, 1142 m, 49.4 mm; 1, RNC 4409, SW of Eureka, Humboldt Co., California (40º30.5 N, 124º26.7 W), trawled 1142 m, 54.6 mm.

Additional material. 1, RNC 4410, W of Point Reyes, Marin Co., California (38º10.6 N, 123º36.7 W), trawled, 1202 m, 83.9 mm.

Distribution. SW of Eureka, Humboldt Co., California (40º30 N) to S of San Clemente Island, California Channel Ids., California (approx. 32º40 N).

Habitat. Found on muddy substrates, at depths of 722-1240 m.

Etymology. Named for Mr. John E. Fitch, who obtained the first specimen, and donated it to the Natural History Museum of Los Angeles County.

Remarks. The genus *Golikovia* is characterized by numerous fine spiral cords in the early whorls, and the usually absent sculpture [the lone exception *G. phoenicea* (Dall, 1907), which has low, broad, weak spiral cords]. This species is referred to *Golikovia* on account of its lack of sculpture, since the early whorls are eroded away.

DISCUSSION

The taxonomy of Buccinidae has been revised recently with the molecular study of the Buccinoidea Rafinesque, 1815 (Kantor, *et. al.* 2021), which demonstrated that that the genus *Colus* Röding, 1798 is not in the family Buccinidae Rafinesque, 1815, but in its own family, Colidae Gray, 1857, unfortunately many groups previously considered to be subgenera or synonyms of *Colus* are now of uncertain taxonomic position, pending further study. This includes the genus *Latisipho* Dall, 1916, which presently includes many species in the northeastern Pacific. For the present I have tentatively placed it in the subfamily Neptuneinae.

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Much of this manuscript is based upon the unpublished notes and images of Dr. James H. McLean (LACM).

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LITERATURE CITED

Clark, R.N. 2019. A new species of *Buccinum* from California (Gastropoda: Buccinidae). In Zoosymposia James H. McLean Memorial Volume, 13: 157-159.

Dall, W.H. 1919. The Molluscs of the Arctic coast of America collected by the Canadian Arctic Expedition west from Bathurst Inlet, with an appended report on a collection of Pleistocene fossil Mollusca. *In* Report of the Canadian Arctic Expedition, 1913-18, vol. 8, part A., Mollusks, 1A-25A.

Golikov A N. & Sirenko, B. I. 1988. New data on the systematics of the subfamily Buccininae (Gastropoda Pectinibranchia Bucciniformes). Proceedings of the Zoological Institute, Leningrad, 176: 85-105. [In Russian]

Habe & Sato, 1973. A classification of the family Buccinidae from the North Pacific. Proceedings of the Japanese Society of Systematic Zoology, 8, 1-8, pls. 1-2

Kantor, Y.I., A.E. Fedosov, A.R. Kosyan, N. Puilliader, P.A. Sorokin, Y. Kano, R. Clark, and P. Bouchet, 2021. Molecular phylogeny and revised classification of the Buccinoidea (Neogastropoda). Zoological Journal of the Linnean Society, 2021, 20:1–69, figs. 1-26.

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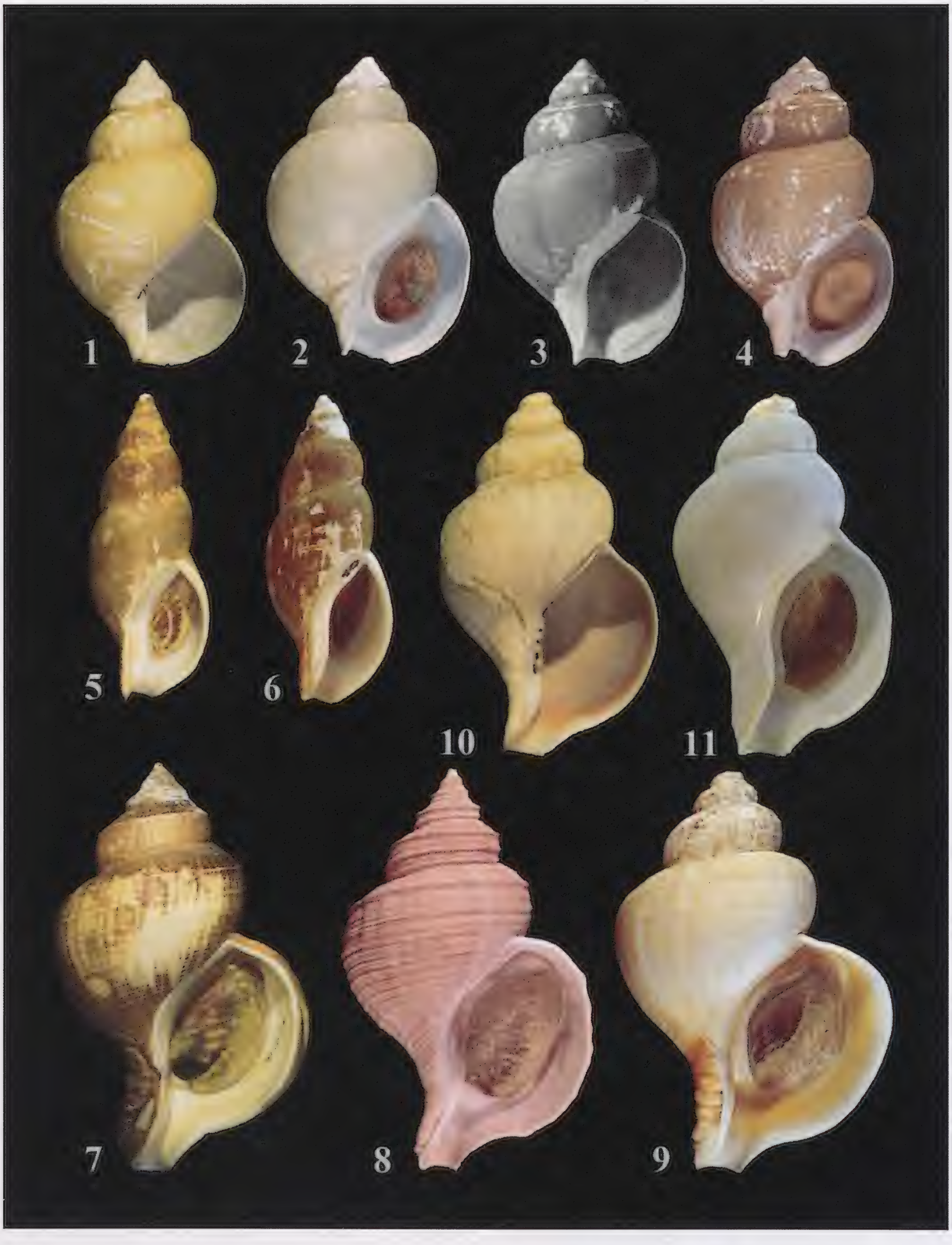

Figure 1= *Buccinum cascadiense* Clark, n. sp., Holotype, LACM 3787. 45.9 mm; **Figure 2**= *B. cascadiense* n. sp. off La Push, Clallam Co., Washington, 1203 m. 42.9 mm; **Figure 3**= *Buccinum viridum* (Dall, 1889), Lectotype, USNM 96557, off Santa Barbara Island, California, 757 m (image by JM McLean). 46 mm; **Figure 4**= *B. viridum*, RNC 4479, off Cape Blanco, Curry Co., Oregon, 1127 m. 45.9 mm; **Figure 5**= *Latisipho ritteri* Clark, n. sp., Holotype, LACM 3780, off Cape Flattery, Clallam Co., Washington, 146-165 m. 40.0 mm; **Figure 6**= *Latisipho ritteri* Clark, n. sp., Paratype 4, RNC 4129, type locality. 44.3 mm; **Figure 7**= *Neptunea flatteryensis* Clark, n. sp., Holotype, LACM 3790, off Cape Flattery, Clallam Co., Washington, 155 m. 137mm; **Figure 8**= *Neptunea pribiloffensis* (Dall, 1919), RNC 4531, near Pribilof Islands, Bering Sea, Alaska, 99 m. 129.8 mm; **Figure 9**= *Neptunea humboldtiana* A. G. Smith, 1971, RNC 4545, off Newport, Lincoln Co., Oregon, 270 m. 114.6 mm; **Figure 10**= *Golikovia fitchi* Clark, n. sp., Holotype, LACM 3670, off San Miguel Island, California, 772 m. 55.4 mm; **Figure 11**= *G. fitchi* Clark, n. sp., RNC 4409, off Eureka, Humboldt Co., California, 1142 m. 49.4 mm.

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Description of four new *Marginella* species, from the Eastern and Southern Cape, South Africa

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ABSTRACT Four *Marginella* species from the Eastern and Southern Cape of South Africa are described. They include *Marginella zigzag*, *Marginella violea*, *Marginella jeareyae* and *Marginella dyoseires.*

KEYWORDS *Marginella*, *M. zigzag*, *M. violea*, *M. jeareyae*, *M. dyoseires*, Fish River, Hougham Park and Jeffreys Bay

INTRODUCTION

Four species of Marginella Lamarck 1799, although known for some time, and mislabeled, show consistent differences and are therefore described from specific areas of the Eastern and Southern Cape.

ABBREVIATIONS

Coll:	Collection of
n. sp.	New species
NMSA	KwaZulu-Natal Museum, Pietermaritzburg, South Africa

MATERIAL AND METHODS

Specimens were photographed by Nicholas Page with a Canon 800D utilizing a dedicated photographic table with adjustable overhead arm. Lenses utilized were a Canon 50 mm and Canon 100 mm Macro lenses. White LED photographic lamps were utilized for lighting with customized, in-camera white balance. Darktable elements were utilized to crop and orientate images.

Images for Plate 1 Figure 2 were photographed by Mark Page. Images for Figures 1-2 were supplied for incorporation by R. Aiken. Images for Plate 6 Figure 1-3 were supplied by A. Seccombe. Image for Plate 6 Figure 4 was supplied by S. Veldsman.

SYSTEMATICS

Family: Marginellidae Fleming, 1828
Genus: *Marginella* Lamarck, 1799

Marginella violea
R. Aiken and A. Seccombe, n. sp.
(Figure 1, Plate 1)

Description. Shells medium, ranging in size from 25 to 29 mm, sturdy, biconic, with blunt, pointed and stepped spire with pale cream protoconch. External varix strong, columella with four strong, pale, continuous plicae covering the lower half thereof. Varix white, slightly curved with radial dashes on the outer edge. Whorl smooth and shiny in uncommon fresh material. Colour of shells is a consistent greyish-violet with three intermittent bands of broken lighter colour. Base of shells has a pale zone overlaid with thin deep brown axial waves.

Type material. The type material of the holotype and paratypes of *M. violea* are as follows:

Holotype:	27.1 x 16.0 mm. (Figure 1, Plate 2.1). NMSA P1892/T4527. Donated by R. Aiken.
Paratype 1:	28.0 x 16.9 mm. Coll: A. Seccombe. (Plate 1.1)
Paratype 2:	28.15 x 16.69 mm. Coll: R. Aiken. (Plate 1.2, Plate 2.2)
Paratype 3:	28.0 x 15.0 mm. Coll: S. Veldsman.
Paratype 4:	25.5 x 15.2 mm. Coll: R. Aiken. (Plate 1.3)
Paratype 5:	29.5 x 17.0 mm. Coll: A. Seccombe. (Plate 1.4)
Paratype 6:	27.1 x 16.0 mm. Coll: J. Rosado. (Plate 1.5)
Paratype 7:	26.1 x 15.8 mm. Coll: S. Veldsman.
Paratype 8:	27.4 x 17.0 mm. Coll: M. Lussi. (Plate 1.6)
Paratype 9:	27.2 x 15.6 mm. Coll: R. Aiken.
Paratype 10:	27.0 x 15.5 mm. Coll: A. Seccombe.
Paratype 11:	24.1 x 14.5 mm. Coll: D. Berschauer.
Paratype 12:	26.8 x 16.1 mm. Coll: M. Page.
Paratype 13:	28.9 x 16.5 mm. Coll: R. Aiken. (Plate 2.2)

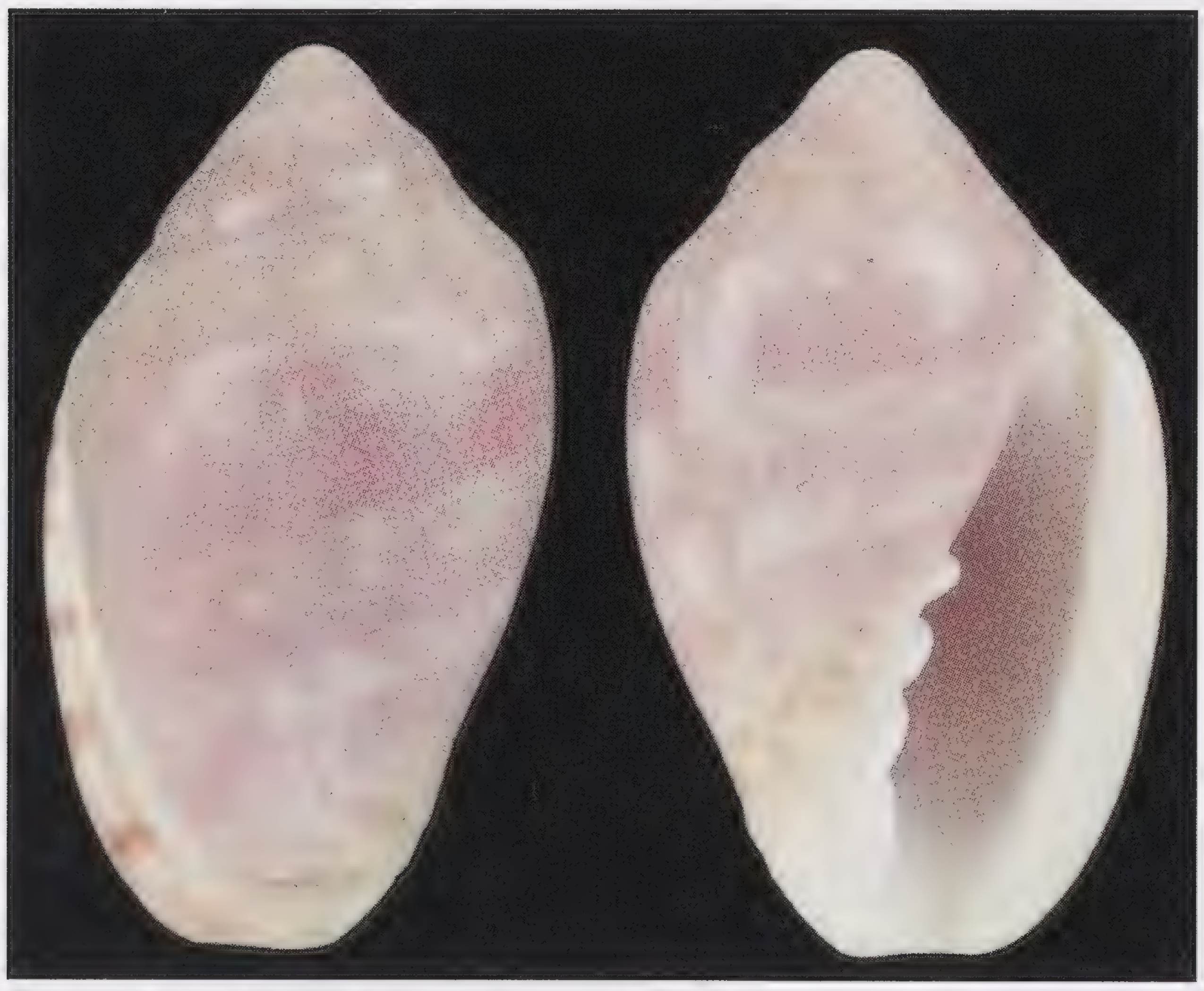
Figure 1. *Marginella violea* - Holotype

Distribution. Beached in the Gonubie / East London area, alluding to a shallow water existence.

Etymology. From the Latin violeus, “of a pale to moderate greyish-violet colour”.

DISCUSSION

This species has masqueraded as a worn or faded *M. rubrovittata* S.G. Veldsman, J.H. Veldsman & R. Aiken, 2016 (previously the ‘red’ *M. ornata* Redfield, 1870), for a long time. It is morphologically similar, but never wine red, and unlike *rubrovittata*, has a pale to white protoconch. It may also be mistaken for *M. roseaflavescens* S.G. Veldsman, J.H. Veldsman & R. Aiken, 2016, but this latter species is characterised by the inclusion of yellow colour in the area of the protoconch, whorl, and mouth. Even in a fresh, shiny state, the colour of *violea* remains light, and is devoid of any radial black markings.

Marginella jeareyae
R. Aiken and A. Seccombe, n. sp.
(Figures 2-3, Plate 4, Plate 5.1-2)

Description. Shells very large for the genus, biconic, ranging from 35.3 to 44.8 mm in size, sturdily built with sharply angled broad shoulder and pointed, somewhat depressed spire. Protoconch white, external varix strong, inner labrum smooth. Columella with four strong, continuous pleats, taking up the lower half thereof. Aperture broad, surface of whorl smooth. Background colour pale cream overlaid with an attractive pattern of light and dark brown (to almost black in single live specimen) broken axial markings, in waves, from suture to base. This pattern forms two vague deeper brown bands on the whorl.

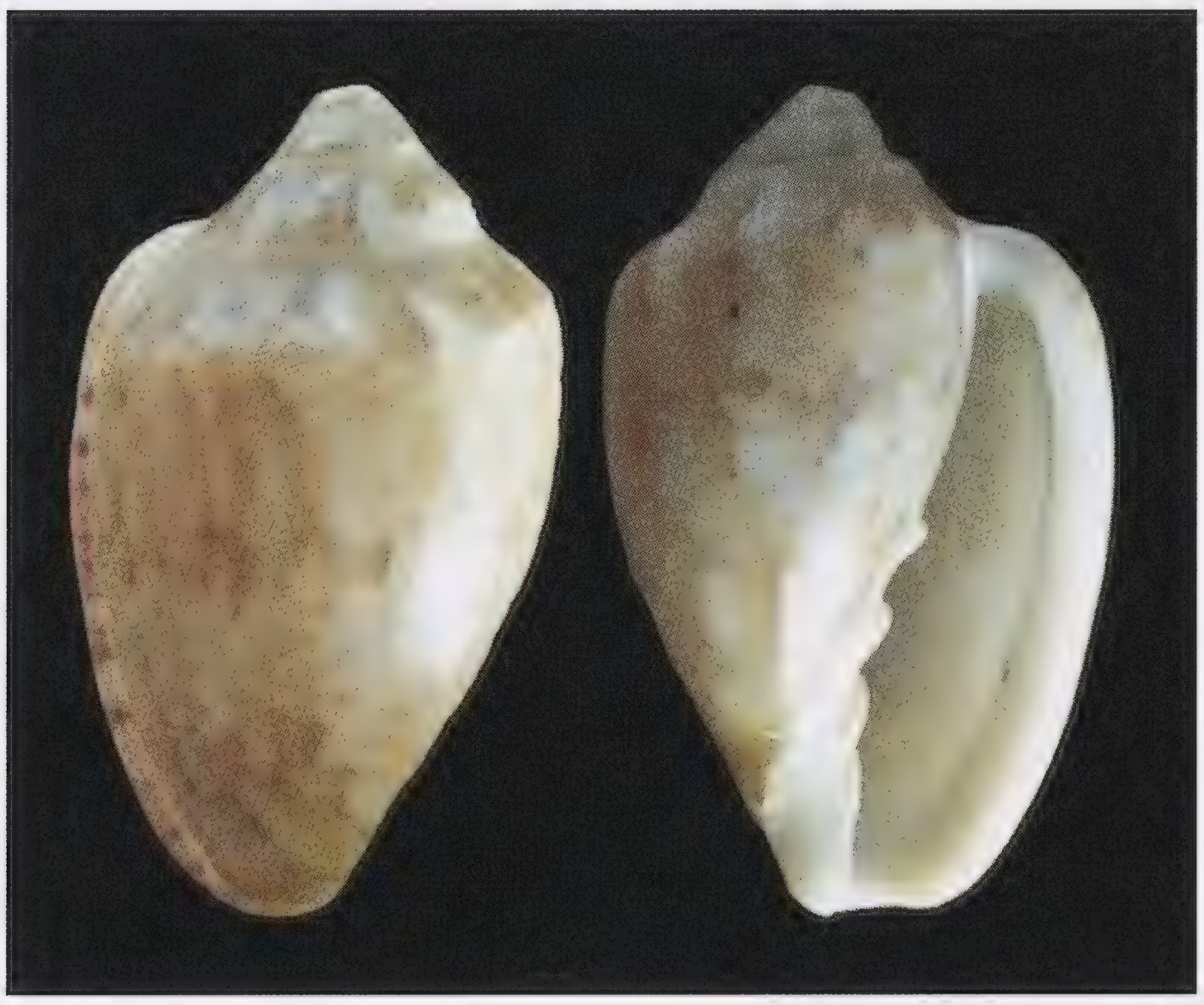

Figure 2. *Marginella jeareyae* - Holotype

The animal is pale cream with sporadic, fairly dense red spots. (Figure 3).

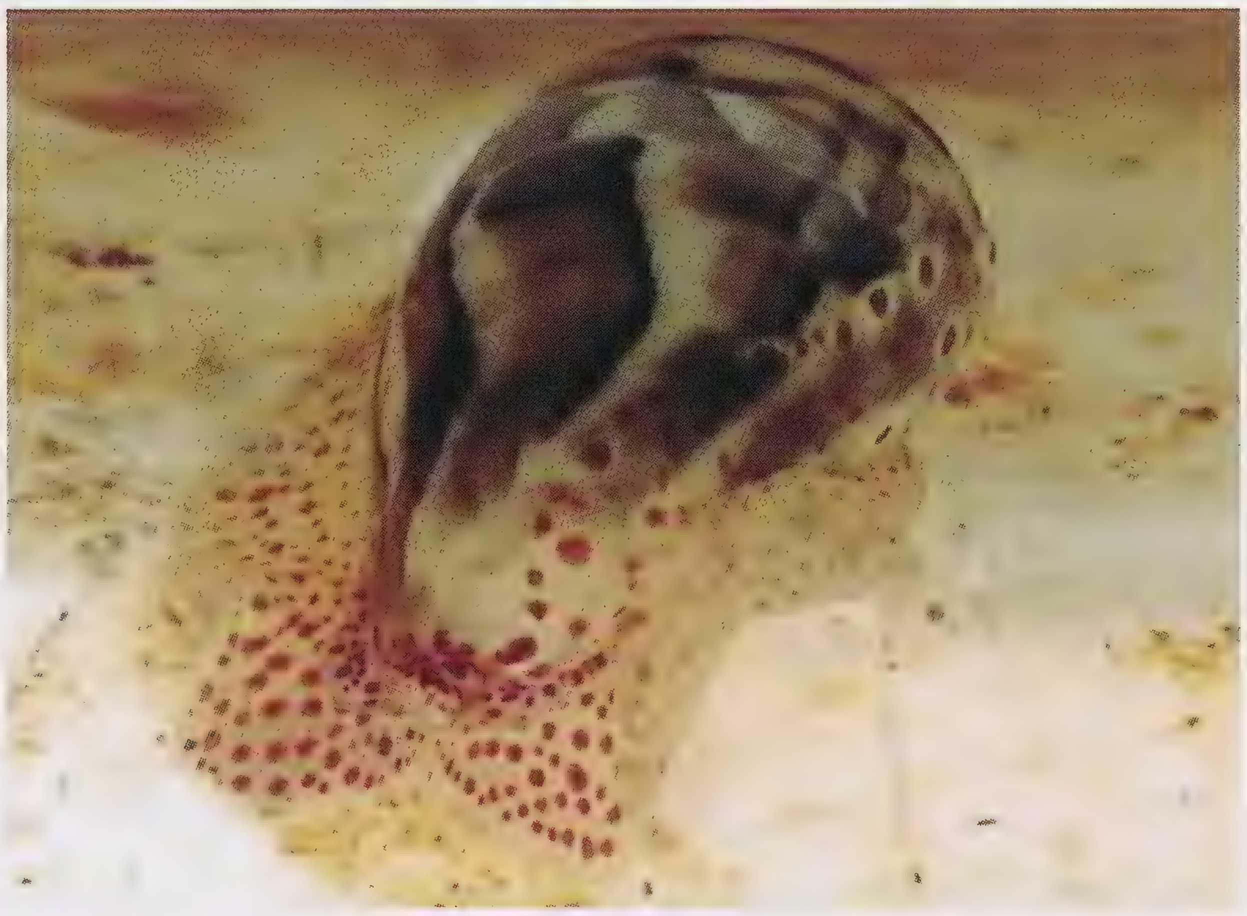

Figure 3. *Marginella jeareyae* – Live.

Distribution. From Port Alfred to Port Elizabeth, rarely found beached. Majority of material originates from a single locale, Hougham Park, Port Elizabeth.

Etymology. Named for Mariette Jearey, who found good specimens on Hougham Park beach.

Type material. The type material of the holotype and paratypes of *M. jeareyae* are as follows:

Holotype:	42.1 x 25.3 mm. (Figure 2). NMSA-Mol OP2011/T4563. Donated by R. Aiken.
Paratype 1:	35.6 x 21.7 mm. A. Seccombe Collection. Port Alfred.
Paratype 2:	37.6 x 20.8 mm. R. Aiken Collection. Hougham Park, beached. (Plate 4.1, Plate 5.1).
Paratype 3:	35.7 x 20.1 mm. R. Aiken Collection. Hougham Park, beached.
Paratype 4:	35.37 x 19.5 mm. R. Aiken Collection. Hougham Park, beached.
Paratype 5:	38.1 x 23 mm. R. Aiken Collection. Hougham Park, beached.
Paratype 6:	38.8 x 30.77 mm. A. Seccombe Collection. East London, Beached.
Paratype 7:	44.4 x 25.3 mm. A. Seccombe Collection. East London, Beached.
Paratype 8:	38.6 x 21.95 mm. R. Aiken Collection. Hougham Park, beached.
Paratype 9:	37.8 x 20.6 mm. R. Aiken Collection. Hougham Park, beached.

DISCUSSION

This large and attractive species has long been labeled in collections as a *M. nebulosa* (Röding, 1798) (Plate 5.3-5.4). *M. jeareyae* is far larger on average, has a different pattern from *nebulosa*, is noticeably broader with sharp shoulder angle, and margin that finishes lower down on the whorl. The colouration of *nebulosa* is pinkish grey, and does not show banding on the whorl, as with *jeareyae*.

It may also be compared with *Marginella abyssinebulosa* Massier, 2004 (Plate 5.5-5.6), but the latter species is always much narrower and has a dense, dark pattern, distinctive from *jeareyae*.

The species that has morphological similarities with *jeareyae* is *M. felixi* Massier, 2004 (Plate 5.7-5.8), however, they are separable as follows: felixi is from deeper water (never beaches), from Mosselbay area, much further south of the *jeareyae* locale and *felixi* has a unique distinguishable feature in the group, namely radial rows of thin, dark dashes covering the entire dorsum.

Marginella dyoseires
R. Aiken and A. Seccombe, n. sp.
(Figure 4, Plate 6)

Description. Shells large for the genus, narrow biconic, ranging from 28 to 37 mm, sturdy with high pointed spire and rounded shoulder. Protoconch translucent white. External varix strong, inner labrum smooth, with faint posterior notch. Columella with four continuous pleats taking up the lower 60 percent of the narrow aperture. Surface smooth, background colour cream overlaid with two distinct rows or bands of broken virtually black colour, laid down in a rough pattern of transverse lines. There are small, randomly placed dots between the banding.

Type material. The type material of the holotype and paratypes of *M. dyoseires* are as follows:

Holotype:	28 mm (Plate 6.1). NMSA-Mol OP2012/T4564. Donated by A. Seccombe. False Bay.
Paratype 1:	32 mm. A. Seccombe Collection. False Bay. (Plate 6.2)
Paratype 2:	35.43 x 19.54 mm. S. Veldsman Collection. Off Plettenberg Bay, in 100 to 140 metres. (Plate 6.4).
Paratype 3:	32.5 mm. A. Seccombe Collection. False Bay. (Plate 6.3).
Paratype 4:	37 x 19.5 mm. R. Aiken Collection. Danger Point 40 metres. (Plate 6.5).

Distribution. From deep water Plettenberg Bay to the eastern point of False Bay.

Etymology. From the Greek: Dyo Seires meaning two rows.

DISCUSSION

This rare species can only be mistaken for *M. hayesi* (Plate 6.6), but differs in being narrower and never has the full pattern prevalent on the whorl of *hayesi*.

Marginella zigzag
A. Seccombe and R. Aiken, n. sp.
(Plate 3.1-3.5)

Description. Shell size medium, ranging from 25 to 32 mm, biconic and sturdy. Shoulder angled, surface smooth, spire high and somewhat blunt. Aperture broad. Strong external varix, columella plications on lower half of columella, continuous and oblique, numbering four. Labial edge white, with short, red radial lines on the far edge only. Colour deep pink to grey, depending on freshness. Pattern consists of axial waves of jagged colour, often with distinctive pattern of dark, long zigzags.

Distribution. Beached and dredged between Fish River and East London.

Etymology. Zigzag. "a line characterised by sharp turns, first to one side, then to the other."

Type material. The type material of the holotype and paratypes of *M. zigzag* are as follows:

Holotype:	28.2 x 16.3 mm. (Plate 3.5). NMSA-Mol OP2010/T4562. Donated by R. Aiken.
Paratype 1:	27.1 x 15.5 mm. Coll: R. Aiken. (Plate 3.3).
Paratype 2:	24.4 x 15.5 mm. Coll: R. Aiken. (Plate 3.4).
Paratype 3:	29.1 x 17.1 mm. Coll: R. Aiken. (Plate 3.1).
Paratype 4:	25.2 x 14.9 mm. Coll: R. Aiken. (Plate 3.2).

DISCUSSION

Although uncommon, this species has for some time been recognized as different by both authors as well as by the late Arie Jooste, whose 2003 label indicates, dredged off EL [East London], "probably undescribed?"

In this group it is of interest that the deeper water, *M. pondo* S.G. Veldsman, 2017 (Plate 3.6) in far North-eastern Cape has a consistent, fine pattern, *M. lussi* Hayes & Millard, 1995 (Plate 3.7-3.8) from around Coffee Bay a more variable pattern, and *M. zigzag*, further south, a "rougher" pattern.

ACKNOWLEDGEMENTS

We acknowledge and thank: Nicholas Page for photography; Mark Page for photography, collation of photos, proof reading and layout; and Elodie Heyns Veale, for kindly supplying museum accession numbers.

LITERATURE CITED

Veldsman, S., V. Veldsman, and R. Aiken. 2016. Review of *Marginella ornata* and Description of three new species of of *Marginella*. Visaya, June 2016, 59-74.

Veldsman, S. 2017. A description of the *Marginella* (*Fasciamarginella*) complex and description of two new *Marginella* species. Visaya Supplement IX, May 2017.

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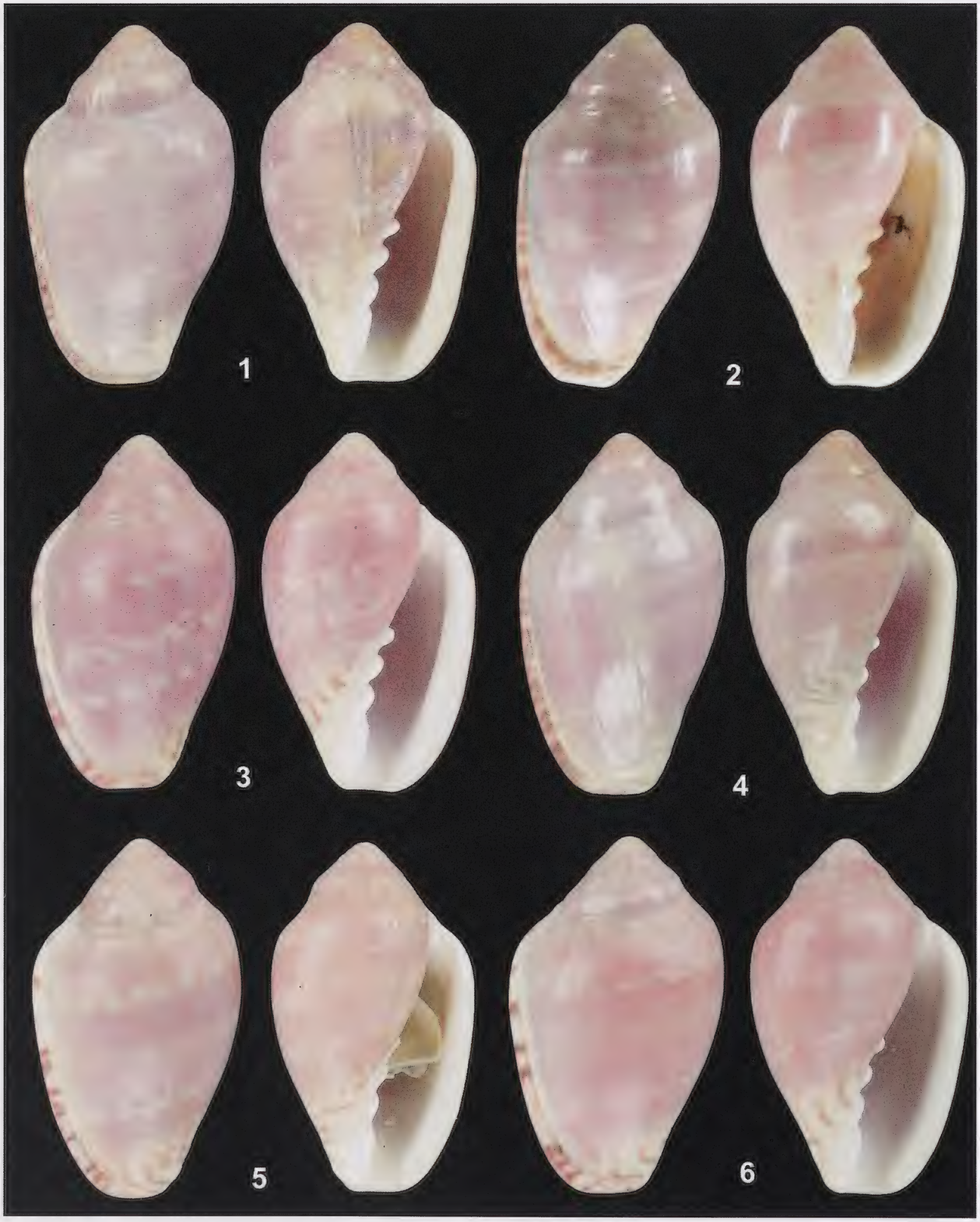

Plate 1. 1= *Marginella violea* Paratype 1 (28 x 16.9 mm); **2=** *Marginella violea* Paratype 2 (28.15 x 16.69 mm); **3=** *Marginella violea* Paratype 4 (25.5 x 15.2 mm); **4=** *Marginella violea* Paratype 5 (29.5 x 17 mm); **5=** *Marginella violea* Paratype 6 (27.1 x 16 mm); **6=** *Marginella violea* Paratype 8 (27.4 x 17 mm).

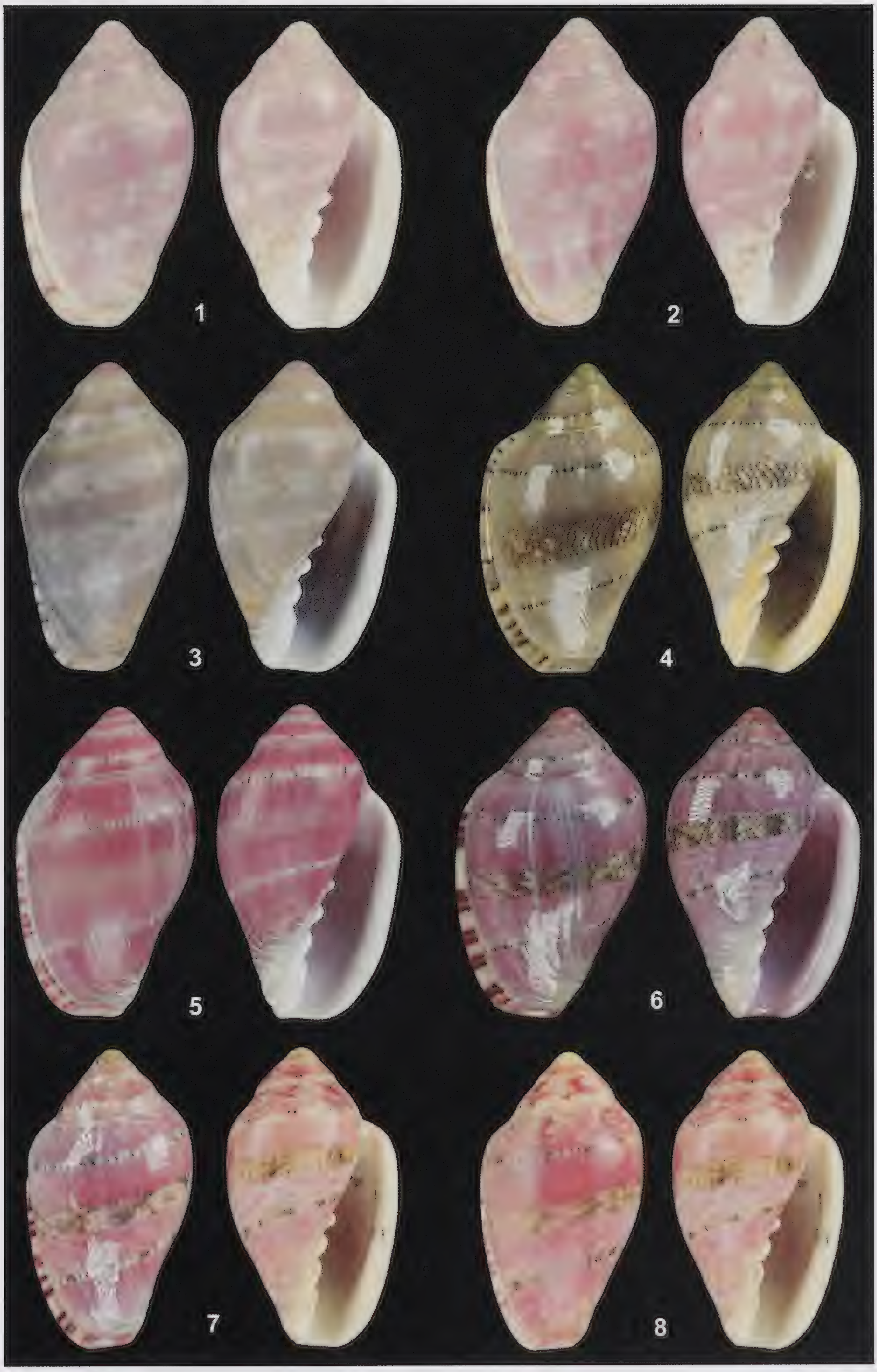

Plate 2. **1=** *Marginella violea* Holotype (27.1 x 16 mm); **2=** *Marginella violea* Paratype 2 (28.15 x 16.69 mm). **3=** *Marginella ornata* grey (23.3 x 14.0 mm); **4=** *Marginella donaikeni* (26.89 x 16.0 mm); **5=** *Marginella rubrovittata* (23.86 x 13.3 mm); **6=** *Marginella rubrovittata* (23.57 x 14.3 mm); **7=** *Marginella roseaflavescens* Paratype 2 (26.44 x 15.52) Coffee Bay; **8=** *Marginella roseaflavescens* Paratype 15 (27.31 x 15.49 mm) Coffee Bay.

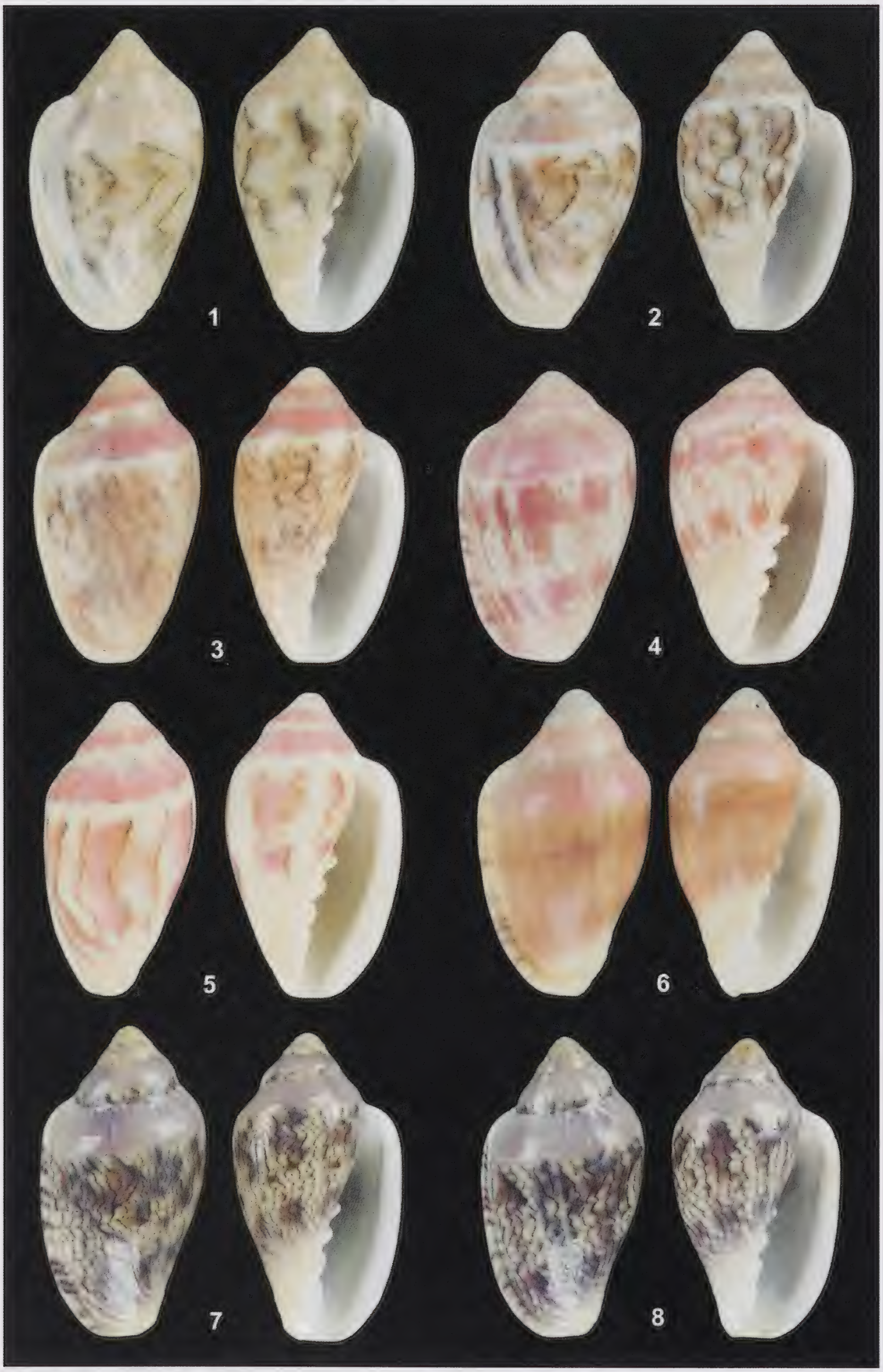

Plate 3. **1=** *Marginella zigzag* Paratype 3 (29.1 x 17.1 mm) Port Alfred; **2=** *Marginella zigzag* Paratype 4 (25.2 x 14.9 mm) Port Alfred; **3=** *Marginella zigzag* Paratype 1 (27.1 x 15.5 mm) Fish River; **4=** *Marginella zigzag* Paratype 2 (24.4 x 15.5 mm) Fish River; **5=** *Marginella zigzag* Holotype (28.2 x 16.3 mm), Fish River; **6=** *Marginella pondo* Paratype 3 (30.68 x 17.27 mm) Mbotyi 90 m; **7=** Marginella lussi (31 x 16.9 mm) Live; **8=** *Marginella lussi* (32.6 x 18.2 mm) Live.

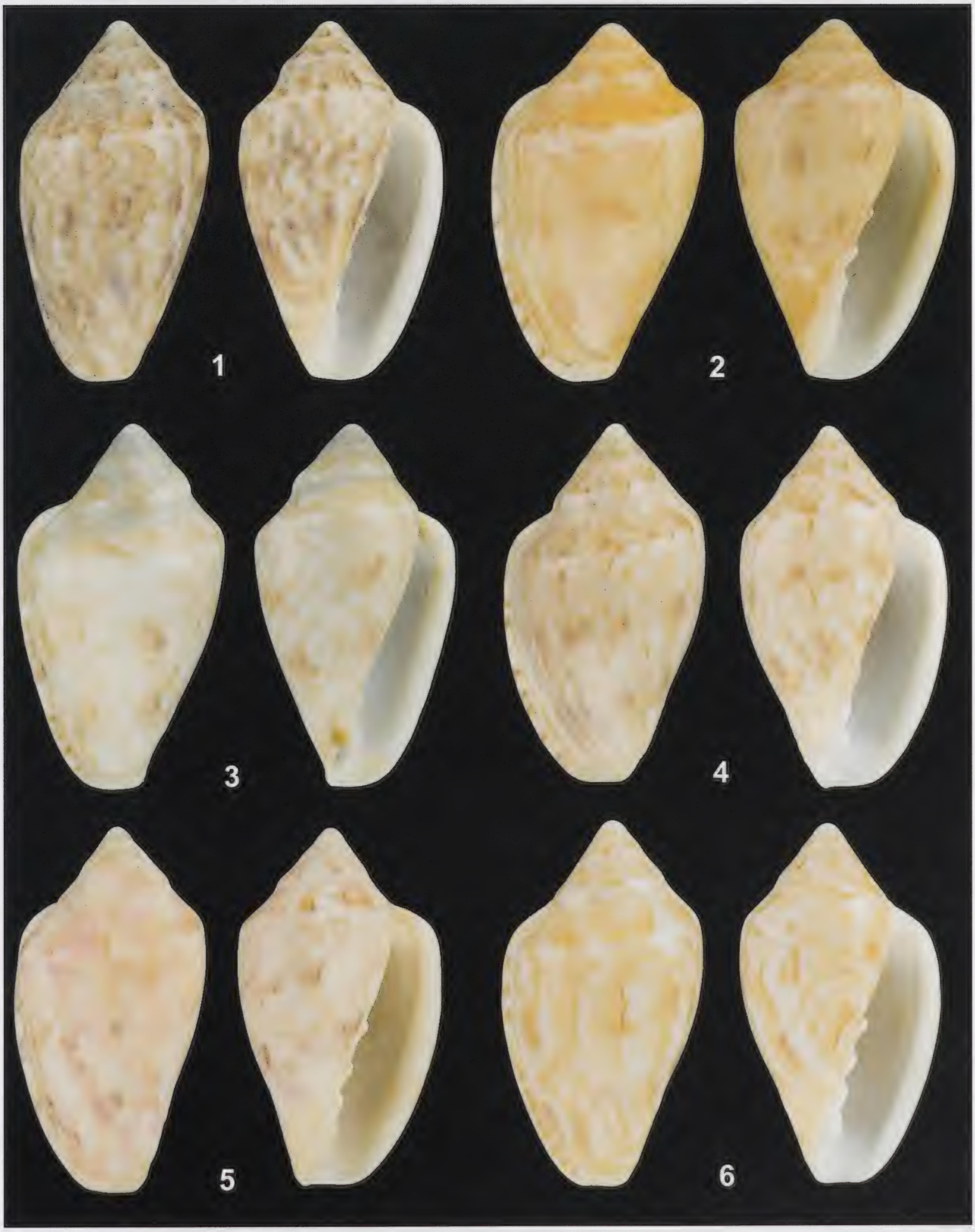

Plate 4. **1=** *Marginella jearaye* Paratype 2 (37.6 x 20.8 mm) Hougham Park beached; **2=** *Marginella jearaye* Paratype 5 (38.1 x 23.0 mm) Hougham Park beached; **3=** *Marginella jearaye* Paratype 7 (44.4 x 25.3 mm) East London beached; **4=** *Marginella jearaye* Paratype 8 (38.6 x 21.95 mm) Hougham Park Beached; **5=** *Marginella jearaye* Paratype 6 (38.8 x 20.77 mm) East London beached; **6=** *Marginella jearaye* Paratype 9 (37.8 x 20.6 mm) Hougham Park Beached.

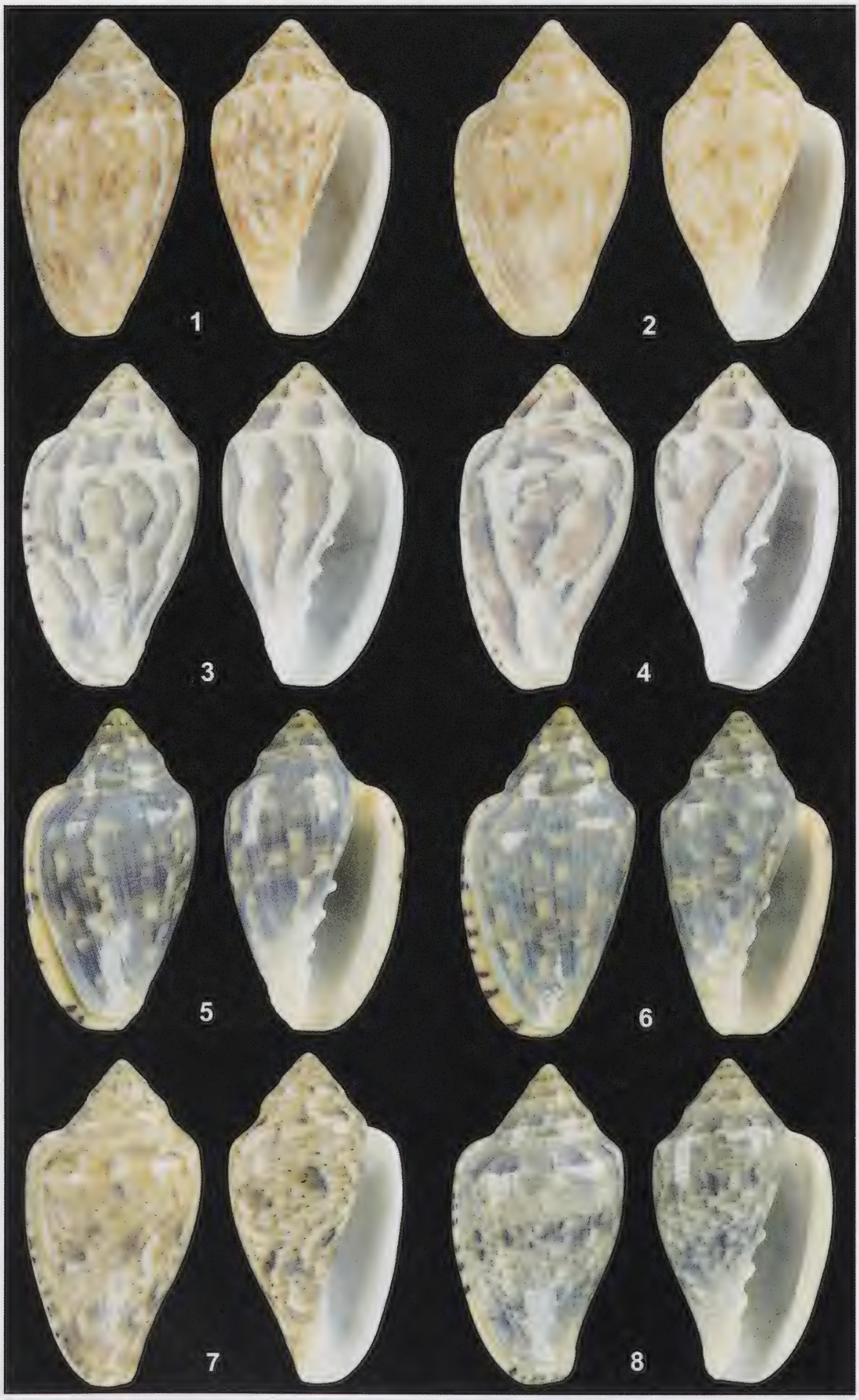

Plate 5. **1=** *Marginella jearaye* Paratype 2 (37.6 x 20.8 mm) Hougham Park beached; **2=** *Marginella jearaye* Paratype 8 (38.6 x 21.95 mm) Hougham Park Beached; **3=** *Marginella nebulosa* (37.1 x 20.3 mm); **4=** *Marginella nebulosa* (37.97 x 21.79 mm); **5=** *Marginella abbyssinebulosa* (39.63 x 22.34 mm); **6=** *Marginella abbyssinebulosa* (40.6 x 20.4 mm); **7=** *Marginella felixi* (46.2 x 25.0 mm) Off Mosselbay; **8=** *Marginella felixi* (41.0 x 22.4 mm) Off Mosselbay 150 m.

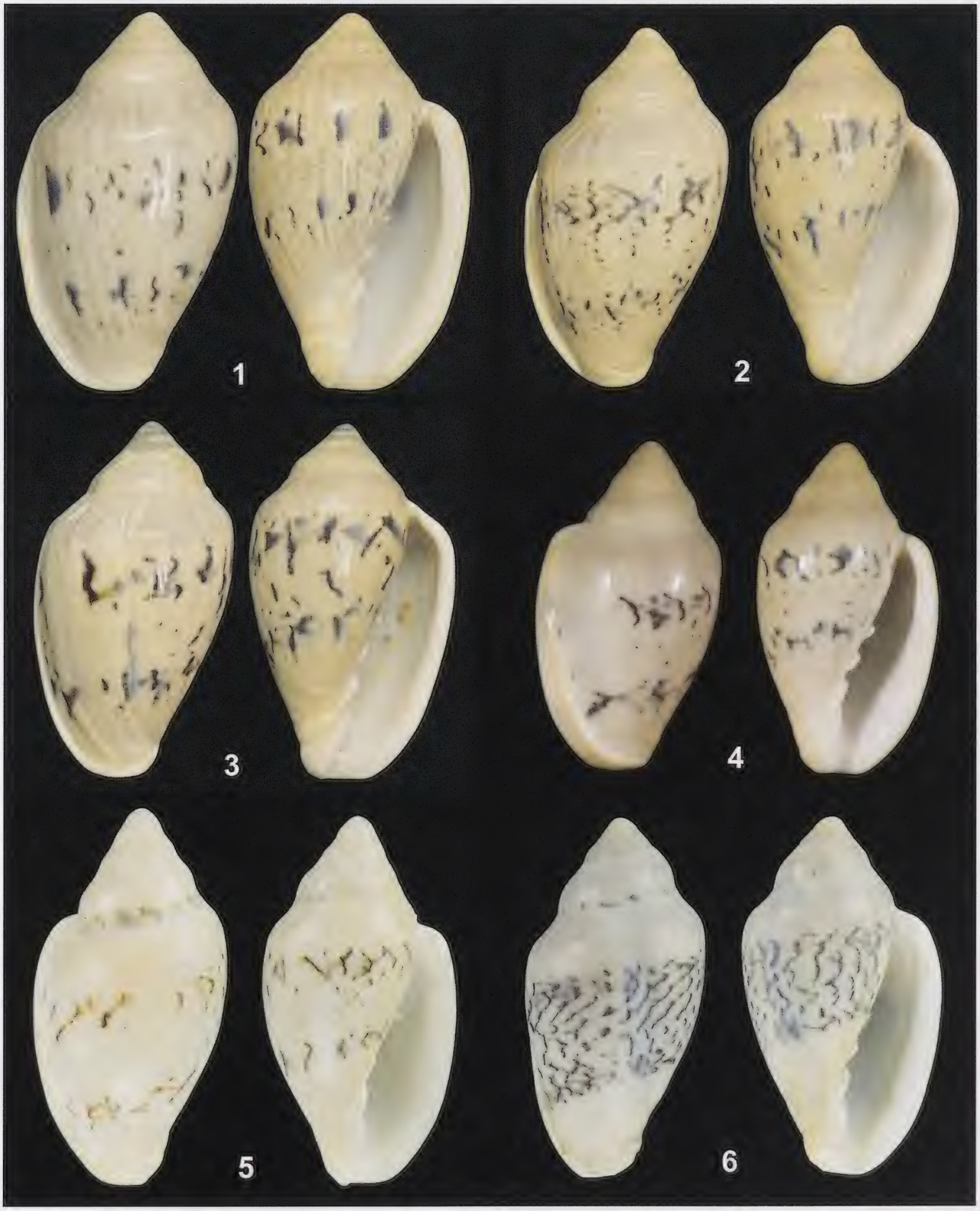

Plate 6. **1**= *Marginella dyoseires* Holotype (28 mm) dived in 18-20 m at night eastern False Bay between Gordon's Bay and Rooi Els; **2**= *Marginella dyoseires* Paratype 1 (32 mm) dived in 18-20 m at night eastern False Bay between Gordon's Bay and Rooi Els; **3**= *Marginella dyoseires* Paratype 3 (32.5 mm) False Bay; **4**= *Marginella dyoseires* Paratype 2 (35.43 x 19.54 mm) Plettenberg Bay; **5**= *Marginella dyoseires* Paratype 4 (37 x 19.5 mm) Off Danger Point; **6**= *Marginella hayesi* (37.1 x 20.98 mm) 15-20 m Bettys Bay, Eastern False Bay.

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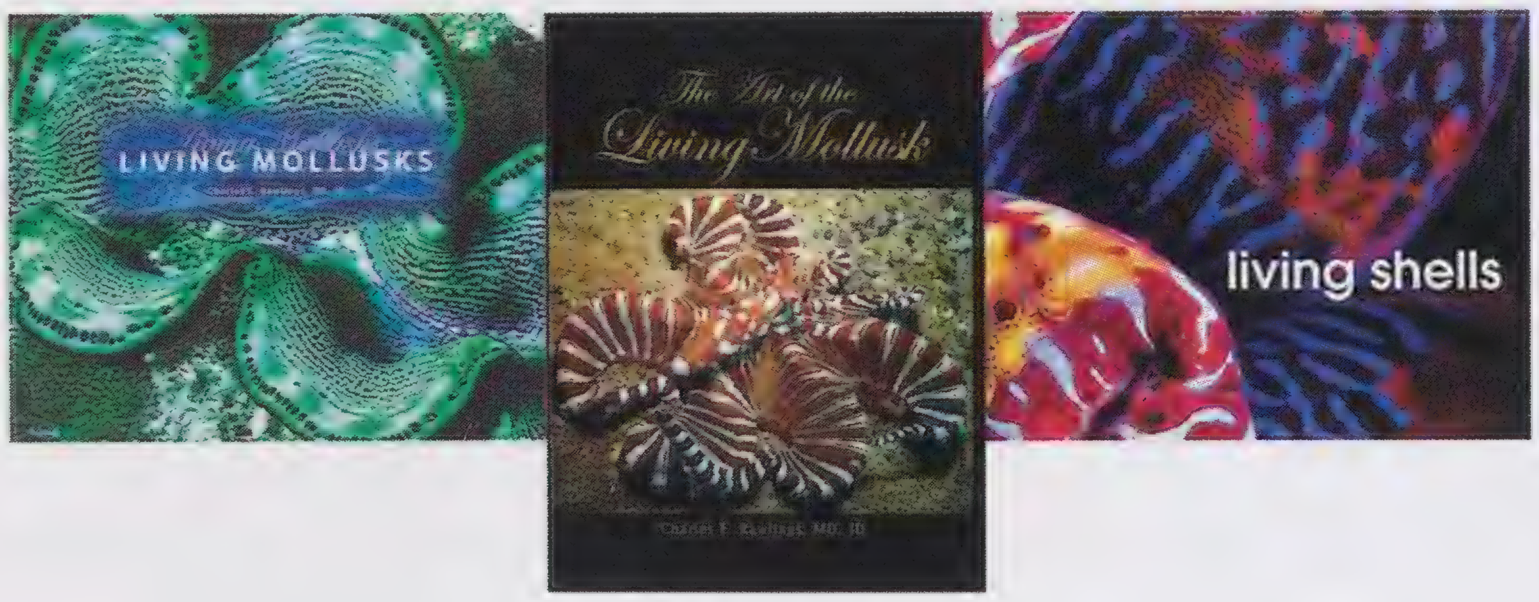
CLUB NEWS

2022 May - General Meeting
Canceled due to Covid-19 concerns and restrictions.

2022 June - General Meeting
The June presentation was given by Paul M. Tuskes on the *Megastraea undosa* and *Megastraea turbanica* and was done over Zoom and had a great attendance. The recording of this talk will be placed a link on the Club's website after the paper summarizing this research is published in a few months.

June and July 2022 - San Diego County Fair, and Shell Bazaar
Canceled due to Covid-19 concerns and restrictions.

2022 August - West Coast Shell Show
Preparation for the West Coast Shell Show in Balboa Park proceeded (the first after two years' absence due to Covid-19).



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Volume: 54 THE FESTIVUS ISSUE 3

Eponymous Mollusk Species Honoring Members of the San Diego Shell Club, Part I: Elsie and Emery Chace

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Regional by name, global in perspective. San Diego Shell Club members have always been purveyors of the mollusks of all the world's oceans. The original Mission Statement for this organization described its founding "in 1961 as a non- profit organization for educational and scientific purposes. More particularly to enjoy, study and promote the conservation of Mollusca and associated marine life through lectures, club meetings and field trips. Our membership is diverse and includes beginning collectors, scientists, divers, underwater photographers and dealers."

Multiple members have been recognized multiple times for their contributions to our understanding of the taxonomy and natural history of mollusks, as demonstrated by the numbers of species named in their honor. This is the first in a series of articles in which we will be discussing aspects of the history of malacology, emphasizing the shell club member namees and their eponymous-named mollusks. It is appropriate to begin with Elsie M. and Emery P. Chace, who were both Charter and Honorary Members of the San Diego Shell Club.

The Chaces led a rather peripatetic lifestyle in their search for mollusks. They were often accompanied by and communicated with other researchers. Hence, this essay will have numerous deviations and detours about people, places, and mollusks to put into context the diversity of their relationships and shell collections. Photographs and brief descriptions of the mollusks are also provided, along with brief biographical sketches of the colleagues who named the eponymous mollusks. When available I have also included the images from the original description.

The following abbreviations are used throughout: AMU-PD, American Malacological Union–Pacific Division; BC, Baja California, Mexico; CA, California, USA; LACM, Los Angeles County Museum; NHMLAC, Natural History Museum of Los Angeles County; SBMNH, Santa Barbara Museum of Natural History; SDNHM, San Diego Natural History Museum; SDSC, San Diego Shell Club; USNM, United States National Museum.

Elsie Margaret Chace (1885-1975) and Emery Perkins Chace (1882-1980)

For over 50 years, the Chaces were prominent members of the California conchological community. That's a lot of time to summarize in a few pages! This sketch of their lives is based on two essays by Faye B. Howard (1970 and 1975), and "in their own words" (Chace, 1967). Quoted material is presented as in the original, with no editing.

Emery was born in 1882 on a dairy farm owned by his parents in Rhode Island. He writes:

"I went to a small district school with about 15 pupils of various ages and then to a small high school at Warren. Later I had a year as a special student at the Rhode Island State College.

"The family moved to Redlands, California in 1901. They bought a small home and I helped Father build a larger house on that property. I picked oranges the first winter that I was there and later took up electrical work. I was an operator in powerhouses and substations of the Southern California Edison Company for some years and later in those of the Los Angeles Water and Power Department of the City of Los Angeles. Eventually I went into construction work in the San Pedro area and stayed with it until after I was 70 years old" (Chace, 1967: 1).

Elsie was born in Sedan, Kansas, 30 August 1885. She moved to Ontario, California, in 1891 with her grandparents, mother, and two younger brothers. In 1901 she was attending the Los Angeles Normal School to pursue a career in teaching (Figure 1).

Emery and Elsie married 25 April 1905. Four children were born between 1905-1910. Only two children survived to adulthood, daughter Ruth C. French, a Licensed Vocational Nurse, and son Gail Chace, a mail carrier at San Pedro.

Conchological Beginnings

Continuing Emery's narrative:

"We first became interested in shells late in 1910 when we spent a week's vacation at Terminal Island, then a modest resort at San Pedro, California. There had been a storm the week before and there were many shells on the beach. The next year we spent in the same cottage and an acquaintance noting our interest in shells told us of a Mrs. Eshnaur who lived nearby and had a large collection of shells. Mr. and Mrs. W. H. Eshnaur invited me (E. P.) to go out with them to work an early morning tide, so I learned much about the shells as we collected. They later taught us about the scientific names and showed us some books about shells....That Christmas brought us a copy of Josiah Keep's 'West Coast Shells' [a gift from Elsie's mother Elsie Herbst] and we later discovered other books about conchology in the Los Angeles Public Library. At that time it was possible to borrow for use at home many books that are now kept in locked cases. Our subscription to the Nautilus also began about that time. A cottage at Seal Beach came into the family about that time so we began a long series of collecting trips to Seal Beach and the adjacent Anaheim Bay. One afternoon, in talking with another shell hunter, Mrs. Chace betrayed that she knew differences among the shells usually lumped as cockles and the other lady was interested. She proved to be Mrs. W. F. Ball, a charter member of the Conchological Study Club of Southern California....The club was limited to 12 ladies and met at the homes of members. Through Mrs. Ball, Mrs. Chace was invited to be a guest at a meeting in Mrs. Oldroyd's home [Figure 3] on Signal Hill....In June of 1913, Mrs. Chace was invited to join the club....

"About 1916, this club was invited to meet at the Southwest Museum and to open its membership to anyone interested in conchology...and that is when I (E. P.) became a member of the Conchological Club of the Southwest Museum" (Chace, 1967: 1-2).

Shortly thereafter Allyn G. Smith and A. M. Strong became members of this fledgling study club. Companions on a life-long journey of exploration were being assembled and their trips began.

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Conchological Journeys: Campsites and Colleagues

"The first ten years of the Chaces' field work was limited mostly to areas served by the Southern California inter-urban system known as the Big Red Cars. Newport-Balboa, San Pedro and Santa Monica were favored destinations. Carrying back-packs [Figure 2], they would take the last car at night, camp on the beach until daylight and then hike to virtually virgin beaches were there was, at that time, no other means of access. They also collected land and fresh water mollusks whenever possible.

"In 1920 they became the proud owners of a Model T Ford – their greatest range extension! For the next forty-odd years, during vacations, on week ends and between construction jobs, they ranged the mountains, deserts and seashore from Puget Sound, Washington to Kino Bay in Sonora, Mexico" (Howard, 1970: 13).

They became the quintessential 20th century hunter-gatherers. Their reminiscences recount their hunting for shells and gathering dinner at the same time. They frequently cooked abalone steaks over a campfire or made a tasty chowder from geoduck, cockles, and mussels. Friends and family were often invited. "In the fall of 1934 there were two collecting trips to record. One was to Morro Bay and my father and mother were along on that one. I dug *Panope* (goeyducks) and Elsie made a big chowder that was enjoyed by all" (Chace, 1967: 17).

Campsite descriptions, usually at collecting sites, are frequent in Emery's 1967 *Reminiscences*. A few selections:

> 1923. "We had a nice party at Mugu Bay May 30-31 and June 1, 1923. That was before the coast road north of Santa Monica was open and we had to go out the Los Angeles - Ventura Highway to Camarillo and then out to Mugu Bay on crooked dirt roads. However, we finally arrived at the south end of Mugu Bay and found a nice campspot and a small spring in a gully not far away. Mr. A. M. Strong and Mr. C. E. White found our camp and worked the low tides with us" (page 7).
>
> 1925. "The tides of July that year were very low and Mrs. Chace and I made a trip to La Jolla and San Diego to try collecting in spots there were not so familiar....The next collecting was at the mouth of Mission Bay where we found several species of bivalves that added to our collection when we got them home. A visit with Dr. Fred Baker filled one evening and was much enjoyed. There was plenty of vacant land on Point Loma at that time and we camped not far from Dr. Baker's home. The next day we drove to the 'Old Spanish Light' and hiked down the hill to collect on the rocks near the actual point" (page 10).
>
> 1929. "In June, 1929, Mrs. Chace and I packed a camp outfit in our old Red touring car, marked the car 'EUREKA OR BUST' and took off up Highway 101....Near Laytonville...we camped beside a big redwood tree the center of which had been burned out but it was still alive. We made our beds in the burned out cavity of the tree....
>
> "Our next move was to Crescent City where I hoped to find some work so as to extend the trip for a week or more. A gang was working on the road about 25 miles up the Smith River Valley and I did get 6 days work on that gang. There we camped in an open spot in the woods about 100 yards from the highway while that job lasted. Back at Crescent City we spent the next 3 days collecting in different localities....

> "On the road again, a 50 mile jump to Pistol River, Oregon, which is only a wide place in the road with a store and a cheese factory. We found a nice campspot near the store and a good colony of snails (*M. fidelis*) not far from camp" (pages 13-14).
>
> 1942. "In September we drove to Sequoia National Park, on up to General Grant Park and eventually down to Whittaker Forest....We collected several specimens of *Helminthoglypta pleuripuncta* which Dr. Berry described from a single specimen. Here we had spread our bed on an old tent platform, no roof, and were awakened next morning by an earthquake. The tops of the trees were swaying apparently about 5 feet" (page 24).

On these trips, coming or going, they would usually stop to visit friends and colleagues such as Bob Talmadge in Willow Creek, Allyn G. Smith in Berkeley, Leo G. Hertlein at the California Academy of Sciences, and Ida Shepard Oldroyd of Stanford University (Figure 3). While in San Diego in 1915, they were introduced to Mr. C. R. Orcutt,

> "who was a well-known collector and had made trips down the coasts of Lower California. In the spring of 1924, we received a letter from him saying that 'if we could come down, select shells and write our own labels, we would be welcome to some of his duplicates many of them from Lower California.' Needless to say, I arranged for time off from the work that I was on and we went to San Diego. We spent a busy afternoon in the Orcutt duplicate room and came away with many species new to our collection. I realize now that he wanted to help others and to spread his duplicates out so a fire or other mishap would not destroy all of them" (page 9).

Charles Russell Orcutt (1864-1929), primarily a botanist, also collected fossil and Recent mollusks, several of which were named in his honor (Bertsch, 2021).

Conchology South of the Border

Their first trips to Baja California were in the vicinity of Ensenada.

> 1926. "There were good low tides in the latter part of January and we made a four day trip to Ensenada, Baja California. This was a chance to collect many species that do not occur at San Pedro or Newport. The largest haul of the trip was about 60 *Pterynotus trialatus* (the three-winged murex) which were found on the rubble reef on the inside shore of Punta Banda at the southwest corner of Todos Santos Bay. It was a bum road the last part of the way to this collecting spot but it was worth it. While we were there three Mexican fishermen came in from out at the end of the point with three sacks of abalones and we bought three of them at 5 cents apiece. We drove back to Ensenada for the night and next day, after looking over the town a bit, including the small museum, we started up the 60 mile road to Tiajuana [*sic*]....It was 3:00 P.M. by that time and we were a long way from the border. However, by driving as fast as was comfortable on the dirt road we made it to the border before the gates were to close at 9:00 P.M." (page 11).
>
> 1937. "On a trip to Ensenada this spring..., leaving the estero we drove around the lower part of the bay to the end of the road at Fish Camp where we found the Burches, Connellys, and the Willetts, all conchologists, already there. The big rocky flat that was exposed at low tide was very good collecting...[and] more than 30 species went into our collecting boxes. Mrs. Chace and I gathered more than 100 *Pterynotus trialatus*...and put 50 of the poorer ones back for breeders. Some of the party went over the hill to Arbolitos on the outer coast and found a somewhat different fauna with several Monterey species in it" (page 19).

Emery's last comment above (1937) was a rather prescient observation. Arbolitos is on the south side of Punta Banda. There are localized areas of cold-water upwelling along the Pacific coast of the Baja California peninsula on the south-facing sides of prominent headlands. The distributional patterns of marine algae (Dawson, 1946 & 1951) and marine invertebrates (Emerson, 1956a & 1956b) are affected. In these areas of upwelling, cold-temperate, northern organisms occur south of their expected latitudinal ranges (Emerson, 1956b: 325). Northern species have been reported from these southern faces (with the upwelled colder waters), and southern species have been reported from the north sides (with the warmer waters). For example, among nudibranchs, *Tambja eliora* (Marcus & Marcus, 1967), which ranges south to Costa Rica, has been reported from Todos Santos Bay, Ensenada (Behrens & Hermosillo, 2005), on the north side of Punta Banda. In contrast, *Atagema alba* (O'Donoghue, 1927) and *Doris montereyensis* Cooper, 1863 (which occur north to Monterey, California, or Alaska), have been reported from the south-facing Arbolitos (Bertsch & Gosliner, 1986; Bertsch, 2014), good examples of Chace's comment above.

Cryptochiton–The Giant Gumboot

During a trip in 1929, Emery and Elsie encountered a very interesting and significant anthropological moment. In *Reminiscences* he writes (Chace, 1967: 13), "At Seaside Beach, a few miles north of Fort Bragg, we saw Indians drying the big chiton (*Cryptochiton stelleri*), apparently for food later in the year." They probably saw a group of the Sinkyone Indigenous People (Akins & Bauer Jr., 2021: xii). This brief comment detours us into a vivid example of human and resource adaptations over time and space, and throughout changing climatic regimes.

Today the southernmost distribution of *Cryptochiton* is the Channel Islands, in southern California. However, in the late 1940s and early 1950s, the Chaces' friends Carl L. Hubbs (1959), S. Stillman Berry, and William K. Emerson (1956a, 1956b) discovered *Cryptochiton stelleri* valves in ancestral Kiliwa shell middens in northwestern Baja California, far south of this species' present distribution. These kitchen midden accumulations were found between Punta China and La Bocana (a coastal site some 12 miles west of Santo Tomás). Hubbs (1959) gave these shell valves a carbon-14 dating to between 2500 to 300 years B.P. This extreme southern occurrence of the chiton was not due to physiographically-caused upwelling, but by cooler-than-present water temperatures along southern California and northern Baja California. This period of climatic change overlaps the European Medieval Climatic Anomaly (ca. 950-1250 C.E.) and the Little Ice Age (ca. 1400-1850 C.E.). Instead of the written records, paintings (e.g., Pieter Bruegel the Elder's 1565 "Hunters in the Snow"), and tree-ring analyses that we have from Europe, the evidence for northwest Baja California is based on Oxygen-18 temperature determination and C^{14} dating of the sea shells (Berry et al., 2019). During this cold period, the Original Peoples "over a long stretch of the Baja California coast fed heavily on the giant chiton" (Hubbs, 1959: 107). Findings in other middens have documented the consumption of *Cryptochiton* by numerous coastal indigenous cultures (including the Aleuts, Quillayute, Coast Miwok, ancestral Ohlone-Costanoan, and Chumash) geographically and temporally, throughout the climatically-changed distributions of this mollusk over time. The Aleutian Unangan(E)/Unangas(A) People continue this culinary tradition today (Unger, 2014), as Emery and Elsie observed with the Sinkyone near Fort Bragg.

San Diego Natural History Museum

Even though Emery was technically retired in April 1954, he and Elsie moved to San Diego to become curators of mollusks at the Natural History Museum in Balboa Park (Figure 4). Their part-time contract specified 100 hours per month. Their "first work was unpacking, labeling, and cataloguing the A. M. Strong collection" (Chace, 1967: 30). They also contributed to the holdings of the SDNHM by curating the collections of Herbert N. Lowe and Joshua L. Baily, Jr.

Their time in San Diego offered the Chaces numerous opportunities to collect fossil and living marine mollusks from the shores and islands of Baja California. Emery traveled to Bahía Tortugas, Baja California Sur, on the Research Vessel *Orca* (Chace, 1956), and to Isla Guadalupe on board the Scripps research ship *Stranger* (Chace, 1958a). Emery and Elsie went to San Felipe and Puerto Peñasco with colleagues and family (Chace, 1958b). In May 1963, he visited the area near Santo Tomás to collect nudibranchs with John Sloan (Chace, 1967: 34). William K. Emerson and Emery (Chace & Emerson, 1959) collaborated on a study of San Diego's Tecolote Creek Pleistocene molluscan fauna.

During these years the Chaces continued their annual participation in the AMU-PD meetings (Figures 5 and 6). At the Asilomar meeting in 1960 they received the society's first Award of Honor, signed by Chairman Rudolf Stohler, recognizing their "long and fruitful devotion to conchology, their kindly interest in younger students, and their unfailing generosity to all" (Figure 7).

The Chaces retired from the San Diego Museum in the spring of 1967, moving back to their home in Lomita, California (Figures 8 and 9). Hanselman (1971) and Martin (1972) updated SDSC members of the Chaces' activities in their retirement years. Fine tributes to and recollections of the Chaces are found in the obituaries published by the San Diego Shell Club (Anonymous, 1975 & 1980) and the Western Society of Malacologists (Keen, 1981). Myra Keen wrote, "The Chaces were especially considerate in helping beginners. I well remember how, in 1934, they were the first experienced collectors to give me advice."

Emery Chace named two still-valid subspecies of land snails, *Helminthoglypta traski misiona* Chace, 1937, and *Ammonitella yatesii allyni* Chace, 1951. He also named the marine gastropods *Paciocinebrina seftoni* (Chace, 1958) and *Nassarius howardae* Chace, 1958. Keen (1981) includes a complete bibliography of the Chaces' publications.

Eponymous Mollusks

GENUS

Bivalvia - Autobranchia - Myidae - Pholadidae
Chaceia Turner, 1955 (Figures 10 and 11)

This genus honoring Emery was named to incorporate a single species of clam, the wartnecked piddock. *Chaceia ovoidea* (Gould, 1851) is a common intertidal pholad, occurring from Bolinas Bay, California, to Bahía San Bartolome, Baja California Sur. Like all members of the family, it is highly modified for burrowing in shale, clay, or mud. The shells have evolved distinct shapes to apply mechanical drilling force to the substrate. In the monotypic genus *Chaceia* the anterior is separated from the highly inflated posterior by a pronounced constriction called the umbonal-ventral sulcus. The bulbous posterior is heavily corrugated with raised sinuous ridges, functioning as a rasping file. The hinge no longer functions to hold the valves in place but is a fulcrum for the rotating, rasping drilling action. Chemical secretions might aid this process (see Coan et al., 2000: 496-503).

Emery notes (Chace, 1967: 28) that while she was researching the pholads, "Our friend Dr. Ruth Turner of the Museum of Comparative Zoology wrote and asked me to get some of the fragile mudborers for her, so another trip to Alamitos Bay in October [1950]. They live in rather soft mud and more were broken than I was able to get into my collecting box whole. They went to MCZ in alcohol." She named the genus "in honor of Mr. E. P. Chace of Lomita, California" (Turner, 1955: 66, footnote 1).

"Mr. E. P. Chace has written that at White Point, San Pedro, California, *C. ovoidea* Gould lives in soft shale rock along with *P. penita* Conrad, *P. gabbi* Tryon and *Parapholas californica* Conrad, but specimens are much less abundant. He collected large specimens with Mr. J. Fitch at Carpenteria, California and found that they made an excellent chowder" (Turner, 1955: 70).

"The family Pholadidae, Parts I-II" were the published version of Ruth Turner's doctoral thesis. Dr. Turner (1914-2000) was an eminent and pioneering marine biologist and malacologist. She held the distinguished Alexander Agassiz Professorship at Harvard University and was Curator of Malacology for the university's Museum of Comparative Zoology. In 1973 she became one of Harvard's first tenured women professors. As part of her studies on Teredidae (the wood-boring bivalve shipworms) she was the first female scientist to use *RSV Alvin*, a deep-ocean research submarine. *Alvin* has made over 5000 deep-water dives. Among its credited discoveries are the deep-sea hydrothermal vents and their associated unique fauna, and the remains of the wreck of the *RMS Titanic*.

SPECIES

Bivalvia - Autobranchia - Galeommatida - Lasaeidae

* *Erycina chacei* Dall, 1916

= *Neaeromya rugifera* (Carpenter, 1864) (Figures 12a-b)

Dall (1916) published a series of "species diagnoses" based on specimens he had found among the collections of the USNM. He described *Erycina chacei* from a single right shell valve, which had been dredged in 155 fathoms off South Coronado Island, BC. However, today it is considered a synonym of *Neaeromya rugifera* (Carpenter, 1864).

This species, the wrinkled montacutid, attaches to the abdomen of the burrowing shrimp *Upogebia pugettensis* (Dana, 1852) and to the setae of the polychaete *Aphrodite*. Dwarf males are housed in the mantle cavities of the females. Adult females reach 22 mm in length (Coan et al., 2000: 325).

Paul Bartsch, Henry A. Pilsbry, and William Healey Dall (1845-1927) were the most prodigious American mollusk-namers. During an 80-year period, from the 1870s to the 1950s, these three gentlemen dominated molluscan taxonomy, naming over 14,000 species.

Dall was born in Boston, Massachusetts. His father "Charles Henry Appleton Dall was one of the first Unitarian ministers to India, and his mother Caroline Welles Healey Dall was a prominent writer and lecturer for women's rights" (Dees, in prep.). He spent over a decade in Alaska, serving on various survey and scientific expeditions as naturalist. In 1880 he began his productive career at the USNM, eventually publishing over 1500 papers or monographs on mollusks, land and marine mammals, birds, geology, obituaries (e.g., Dall, 1909, for the Danish nudibranch expert L. S. R. Bergh), etc.

In many ways, Philip Pearsal Carpenter (1819-1877) had "set the bar" for Dall, Pilsbry, and Bartsch, naming hundreds of mollusk species from a variety of museum and private collections from the 1850s to the 1870s. For example, in his *Catalogue of Mazatlan Shells in the British Museum* (Carpenter, 1857), he described 222 new species from the Mexican Pacific. Born in England, Carpenter became an ordained Presbyterian minister, leading congregations in Stand and Warrington. He spent a year and a half visiting Canada and the US, returning to England in 1860. During his trip he met not only with scientists, but also with temperance and anti-slavery groups, which he quite strongly supported. In 1865 he moved his family to Montreal, Canada, continuing his conchological research. He was active in social concerns, analyzing health and death records and arguing for vaccinations. Regrettably, he died from a typhoid infection, probably gotten from his working in unsanitary conditions.

Gastropoda - Caenogastropoda - Semisulcospiridae
Juga chacei (Henderson, 1935) (Figures 13 and 14)

Originally placed in the genus *Goniobasis* I. Lea, 1862, this is a freshwater snail. It has a small, slender, and rather smooth shell of 12-15 mm in length, 7 or 8 whorls with fine striae, and an elongate oval aperture. It is known from the Smith River and its various creeks and branches in Del Norte County, California. Type material was collected by Emery and Elsie Chace, probably in the early 1930s (no collecting dates were given by Henderson in the original description).

The author of the species, Junius Henderson (1865-1937), was a county judge in Colorado who developed a strong interest in geology and the natural history of mammals and birds, reptiles and amphibians, and mollusks. He worked with Theodor Dru Alison Cockerell to establish the University of Colorado Museum, where he deposited his studied material. Although T.D.A. Cockerell was primarily an entomologist (Bertsch, 2015), he also collaborated with Charles Eliot (Cockerell & Eliot, 1905) and Frank MacFarland (see *Limacia cockerelli* and *Felimida macfarlandi*) on nudibranch studies and wrote Henderson's obituary, which was published in *The Nautilus* (Cockerell, 1938).

This and the following species, before DNA studies clarified our understanding of gastropod phylogeny, had been considered freshwater Prosobranchia.

Gastropoda - Caenogastropoda - Pomatiopsidae
Pomatiopsis chacei Pilsbry, 1937 (Figure 15)

Type specimens of this small freshwater snail were collected by the Chaces "from a swampy place 6 miles up the highway from Klamath, Humboldt Co., California" (Pilsbry, 1937: 84) in 1933 and 1936. The shell is brownish olive with a white, rather obtuse apex. The six to eight strongly convex whorls are sculptured with light wrinkles and a close, fine, microscopic spiral striation. The striae are waved and visible chiefly on the last whorl. The aperture has the usual *Pomatiopsis* widely ovate shape. The shell is about 4.5 mm in length.

"*Pomatiopsis chacei* is known only from scattered sites in western California and Oregon. In California, it has been documented in Humboldt and Del Norte counties where it has been found at a small number of sites near the towns of Crescent City and Klamath....In Oregon, *P. chacei* is known only from one historical record at Sixes River in Curry County" (Jordan et al., 2013). The habitat is riparian, in shaded swampy areas and margins of seeps and springs (Duncan, 2008). Assessment of threats include logging, grazing, and urbanization of low areas along northwestern California's redwood coast and adjacent southwestern Oregon. The species is further threatened by diversion and ditching of springs and seeps and by highway location, construction, and maintenance (Jordan et al., 2013).

The namer of this species, Henry A. Pilsbry (1867-1957), was a prodigious namer of molluscs (5,680 species names introduced). "For at least half a century, his was the dominating inspiration in the field of malacology" (Baker, 1958: 83). Most of his career was spent at the Philadelphia Academy of Natural Sciences. He also founded the molluscan journal *The Nautilus* in 1889. It is still being published!

Gastropoda - Caenogastropoda - Epitoniidae
* *Opalia chacei* Strong, 1937

= *Opalia wroblewskyi* (Mörch, 1875) (Figures 16 and 17a-b)

When A. M. Strong named this species, he began, "Closely related to the previous species [i.e., *Opalia wroblewskyi* (Mörch, 1875)], and in some collections confused with it, is a more southern shell which is somewhat smaller, heavier, and proportionately broader" (Strong, 1937: 5). It has a rather complicated taxonomic history, including various replacement names (DuShane, 1979), but today it is considered a synonym of Mörch's 1875 species (Rosenberg, 2011). The geographical distribution, as northern/southern "morphs," is reminiscent of recent advances in Nudipleura taxonomy using DNA analyses, where previously synonymized species are considered distinct cryptic species (see the study of *Berthella chacei* by Ghanimi et al., 2020). The various synonyms of this species were all based on examination of shell features. Might the Californian *O. chacei* and the Alaskan/Canadian *O. wroblewskyi* present a similar resolution, distinct cryptic species, if genetic analyses are performed on animals collected across their entire ranges? Overlapping of the ranges between the extremes is not unknown.

Shells described by Strong were approximately 28 mm in length. "Eight heavy varices continue over the body whorl to the well-defined basal disk at all stages of growth, and the punctuation of the outer layer of the shell is distinct in well preserved specimens" (Strong, 1937).

A native Californian, Archibald McClure Strong (1876-1951) was born in Westminster. He received a bachelor's degree in chemistry from Stanford University in 1899. He worked as a mining and civil engineer with various mining companies and as county surveyor and city engineer in Bishop, California. After his marriage to Mary Watterson, he moved to Los Angeles in 1911 where he maintained a general practice as a mining and civil engineer. Joining the Conchological Cub of Southern California, he avidly collected shells along the California coast, often with Emery and Elsie Chase. Most of his publications (in collaboration with Fred Baker, Ulysses S. Grant IV, G. Dallas Hanna, Leo George Hertlein, and Herbert N. Lowe) were based on shells collected by research expeditions of the California Academy of Sciences, the Allan Hancock Foundation, and others. Strong died at Balboa, California, on 14 July 1951.

Gastropoda - Caenogastropoda - Triviidae
Pusula elsiae (Howard & Sphon, 1960) (Figure 18)

Originally placed in the genus *Trivia* Gray, 1837, this species is known only from a few locations in the northern Gulf of California. The small (7-8 mm) ovate shell has 18 smooth ribs, eight of which are intercalary. The remaining 10 pass over the columella where they are knobbed.

This species was "named in honor of Elsie M. Chace for her long-standing interest in conchology and for the unstinting help which she has given the authors over the many years they have known her" (Howard & Sphon, 1960: 43).

A few years earlier, Emery had named *Nassarius howardae* Chace, 1958, in honor of Faye. That species' holotype was collected in December 1956 by Elsie Chace and Faye Howard at Almeja Beach, about 5 miles north of San Felipe, BC. Friends for over 40 years (Howard, 1975), these three conchologists went on numerous collecting trips together.

From 1960 until shortly until her death, Faye Howard (1907-1984) was an influential benefactor of the Santa Barbara Natural History Museum, helping to build its shell collection with donations from collectors (notably, the S. Stillman Berry collection) and other museums, and by her own collecting efforts along the southern California coast and in the Gulf of California. She even went on a shell-collecting trip to Baja California with the famous "Perry Mason" novelist Earle Stanley Gardner.

Gale G. Sphon (1934-1995) worked in the malacology departments of the SBMNH (from 1961-1968, along with Faye Howard), and the NHMLAC (from 1968-1992, assisting James McLean and Lindsey Groves). Most of his scientific papers were on nudibranchs and Mitridae. Among other species, the bivalve *Acesta sphoni* (Hertlein, 1963) and the nudibranch *Felimida galexorum* (Bertsch, 1978) were named in his honor.

Gastropoda - Caenogastropoda - Neogastropoda - Borsoniidae
* *Moniliopsis chacei* Berry, 1941

= *Ophiodermella cancellata* (Carpenter, 1864) (Figures 19 and 20a-b)

Berry named this species from fossils collected by him, R. K. Cross and Emery Chace (from 1934 to 1939) at the Pleistocene Hilltop Quarry site in San Pedro, California. It has since been synonymized with *Ophiodermella cancellata*. Palmer (1958) and McLean (1996) give the full taxonomic history of this species.

Ophiodermella cancellata is a specialized vermivore (Shimek, 1983), preying on the oweniid polychaete *Galathowenia oculata* (Zachs, 1923). The small shell (11-12 mm) has 6 rounded whorls, with “axial and spiral sculpture producing [a] coarse clathrate pattern” (McLean, 1996: 137). The white shell is covered with a brown periostracum. The species occurs from Kachemak Bay, Alaska, to Tanner Bank (off the Channel Islands), California, on sandy, silty, or shell fragment bottoms from 50-500 m depth.

The common name for this species is the cancellate snakeskin snail (see Drumm et al., 2016).

S. Stillman Berry (1887-1984) was a true multi-disciplinary scholar. His interests spanned such diverse themes as genealogy, horticulture (he introduced over 2000 varieties of irises and daffodils), classical languages, petroleum geology, philately, and other academic and esoteric subjects. He published 209 zoological titles, mainly on mollusks, but also several on beavers, magpies, and sparrows. He introduced 401 taxa for mollusks, concentrated in land snails, cephalopods, and chitons. Hertz (1984) illustrated the holotype specimens of mollusks he named in his self-published “Leaflets in Malacology.” Over two dozen mollusk species have been named in honor of S. Stillman Berry.

“He had no remunerative affiliation with any museum or university and worked from his home in Redlands, California. He relied on his own boundless enthusiasm, his meticulously curated collection, and his magnificent library to provide the stimulus and resources for his research” (Sweeney & Roper, 1984: 63).

Berry was born in Unity, Maine, but his family moved to Redlands, California, in 1897 out of concern for his health. After receiving a doctorate from Stanford University in 1913, he worked as a librarian and research assistant at the Scripps Institution in La Jolla until 1916. He left academia and spent the rest of his life running a horticultural business in Redlands and overseeing his family’s 55,000-acre sheep and cattle ranch in Montana (Dees, in prep.).

Gastropoda - Caenogastropoda - Neogastropoda - Pseudomelatomidae
Crassispira chacei Hertlein & Strong, 1951 (Figures 21 & 22)

This was one of 6 species of *Crassispira* that Hertlein & Strong (1951) named from shells collected by the Templeton Crocker Expedition (1936) and the Eastern Pacific *Zaca* Expedition

(1937-1938). Most of these species are now known to have widely ranging distributions throughout the tropical west American faunal region. However, *C. chacei* appears to be a Gulf of California endemic, reported from Isla Tiburón to Arenas Bank, in depths of 40-100 m.

Typical for *Crassispira*, the shell is fusiform, and anteriorly truncate; the back of the last whorl has a thickened axial rib behind the lip (Keen, 1971: 715). A distinctive feature of this species is a small anal sinus "with a raised pile of callus on the body" (Hertlein & Strong, 1951: 73). The shell reaches 33 mm in length (Draper, 1987).

It was "named for Emery Chace of Lomita, California, an indefatigable collector of west American shells" (Hertlein & Strong, 1951: 74).

Leo George Hertlein (1898-1972) spent a career of 45 years at the California Academy of Sciences. Born on a farm in Pratt, Kansas, he moved west to study at the University of Oregon, and then continued his post-graduate studies at Stanford University. His doctoral dissertation was on the Pliocene geology and paleontology of the San Diego area. He authored or co-authored 150 publications on Recent and fossil mollusks, brachiopods, and echinoderms from the eastern Pacific, introducing some 500 new taxa. He published 18 papers with A. M. Strong.

See the above entry on *Opalia chacei* for information about A. M. Strong.

Gastropoda - Heterobranchia - Nudipleura - Pleurobranchidae
Berthella chacei (J. Q. Burch, 1944) (Figures 23a-b and 24a-b)

To understand the taxonomy, anatomy, and distribution of this species, we have to look at publications spanning 120 years, from 1900 to 2020. Because of my own personal interest in Nudipleura, I am presenting a lengthier description of this species than the other Chace eponyms discussed herein. What follows is a simplified overview of its taxonomic history (see Ghanimi et al., 2020, for all the complicated maneuverings of its systematic placements).

Dall (1900) named *Pleurobranchus californicus* from two specimens, the holotype from White Point, San Pedro, California, collected by Ida Shepard Oldroyd, and one collected at San Diego, California, by C. W. Gripp. Dall described aspects of its external morphology and the shape of its thin, internal shell, commenting on its differences from *P. digueti* Rochebrune, 1895. Bergh (1902: 379-380) transferred this species to his genus *Oscaniella* Bergh, 1897, based on the dissection of a specimen that Dall had sent him. However, Odhner (1926) and Thiele (1931) regarded this genus as a synonym of *Pleurobranchus* Cuvier, 1805.

John Q. Burch (1944) named *Pleurobranchus chacei* based on five specimens collected by Emery and Elsie Chace at Crescent City, California, in 1933. He used shell characteristics to distinguish this species from *P. californicus* and *P. digueti*.

MacFarland (1966: 84) synonymized *P. chacei* with *P. californicus* and then entered into the literature (pages 84-89) the new subspecies *Pleurobranchus californicus denticulatus*. He described the ground color of the dorsum as dead white, with "the peripheral portion of mantle, top of foot, and frontal veil sprinkled with minute white flecks; the distal halves of the rhinophores thickly sprinkled with white." These distinguishing white flecks are clearly illustrated on his Plate 5.

Lance (1966: 71) changed *P. californicus* to the genus *Berthella*, hence the binomial *Berthella californica.*

For over a half century, all was quiet on the western California front of this sea slug's taxonomy. Then DNA analyses became the de rigueur method to investigate taxonomic relationships; the taxon Opisthobranchia fell; family, generic, and species level names were completely revised and changed. Which brings us to Hessam Ghanimi, a graduate student of Ángel Valdés at California State Polytechnic University, Pomona. Using molecular techniques, good old-fashioned detailed dissections, and natural history information, he and his colleagues determined that there was a complex of two species, what they termed the northern and southern morphotypes. Both were identifiable as two previously named species, *Berthella chacei* and *B. californica*, respectively.

Berthella chacei "reaches lengths of about 70 mm and has white spots of variable size covering its milky white to cream mantle, as well as the foot, rhinophores and oral veil. The white spots on the mantle are on tubercles and the rest of the mantle is typically smooth...[It] lays a white egg mass that is a relatively low, wavy, coiled ribbon" (Ghanimi et al., 2020). These white spots are lacking in *B. californica*; the egg mass of that species is more delicate, less wavy, and darker colored.

Berthella chacei is found from the Sea of Japan (East Sea) across the North Pacific to central California, intertidally to 100 m depth.

John Quincy Burch (1894-1974) was the founder and indefatigable editor of the *Minutes of the Conchological Club of Southern California* for 20 years. In addition to publishing scientific articles and species lists about mollusks, it was a clearing house of information about shell collectors and their collecting. A great example is Elsie's description of the family's 1948 summer vacation (Chace, Elsie, 1948). She wrote, "E. P. and I left here June 22nd, turned off the Ridge Route to Frazier Mountain Park. George Willett had had something interesting from up in there but Emery and I didn't find it. For one thing there had been a fire up in that mountain (careless cigarette if I remember correctly)." They did collect a good set of *Helminthoglypta allyniana* (Berry, 1920), a land snail named in honor of Allyn G. Smith (1893-1976).

J. Q. Burch was born in Chillicothe, Missouri, grew up in El Paso, Texas, served in World War I as a Marine Corps aviator, and then spent most of his career as a book seller and book shop owner in Los Angeles. He married Rose Adams in 1916. Their son Thomas and daughter-in-law Beatrice La Rue Burch moved to Hawaii in 1971, continuing the family tradition and publishing various papers on mollusks, including species descriptions (such as those in Warén, Burch & Burch, 1984).

Gastropoda - Heterobranchia - Tectipleura - Pyramidellidae
Chrysallida chacei (Bartsch, 1927) (Figures 25 and 26a-b)

This and the following species were originally named within the taxa *Odostomia* (*Chrysallida*), but that subgenus is now considered a full genus, hence the present placement. Both genera, *Odostomia* J. Fleming, 1813, and *Chrysallida* Carpenter, 1856, are among the most speciose genera of the minute pyramidellid sea shells. The group is in major need of a modern taxonomic revision.

The validity of this species may be questionable, since Jim McLean (in mss.) considered it to be a synonym of *Chrysallida lucca* (Dall & Bartsch, 1909) (Pat LaFollette, pers. comm., 2 December 2021).

The elongate-ovate shell of *Chrysallida chacei* is bluish white, with five post-nuclear whorls. Besides the citation in the original description, the only reports of this species are found in an identification key (Strong, 1946) and in a species list (Burch, 1946). It was described from a 2.9 mm specimen collected by E. P. Chace at Cayucos, California. Reports of *C. lucca* have been equally rare, with records in the original description from "off San Diego," and "off Santa Catalina Island."

Paul Bartsch (1871-1960) is a well-known 20th century American malacologist. He was born in Tuntschendorf (now Poland). His father Heinrich (later Henry) was the proprietor of an inn and general store. His mother Anna Klein Bartsch studied obstetrics, delivering hundreds of babies in their village. Because of the depression following the Franco-Prussian War, the family moved to the U.S., eventually settling in Burlington, Iowa, where his mother continued her midwife services. Young Paul's earliest jobs included being a cigar maker, working in a pickle factory, and as an upholsterer. During his college years at the University of Iowa, his interest in nature was developed into the scientific skills he used for the rest of his life.

He began working at the USNM in April 1896 as an Aid in the Department of Mollusks at a salary of $50 a month (Rehder in Ruhoff, 1973). In 1914 he became a full Curator. His major interests were in marine pyramidellids and land and freshwater mollusks. His collecting trips were worldwide: the Philippines, South China Sea, Missouri River, Cuba, the Greater and Lesser Antilles, Florida Keys, and elsewhere. Studying the extensive collections of sea shells in the United States National Museum, he named 3,278 new taxa (Ruhoff, 1973). After 50 years at the USNM, he retired in 1956 to his estate on Mason's Neck, on the Potomac shore of Virginia, where he spent his final years working on the conservation and botanical enhancement of his 458 acres of land.

His last scientific paper (Bartsch, 1955) was on the Pliocene pyramidellids of Florida, in which he named *Odostomia* (*Evalea*) *emeryi*, in honor of Daniel L. Emery of St. Petersburg, Florida, NOT Emery Chace!

Chrysallida elsiae (Willett, 1948) (Figures 27 & 28)

Another rare little pyramidellid, recorded only from the Pleistocene deposits at Newport Bay, California (Kanakoff & Emerson, 1959).

Shell small (~2.7 mm), elongate-ovate with channeled sutures. "Nucleus tilted, partly immersed in succeeding turn. Post-nuclear whorls ornamented with slightly retractive axial ribs running from suture to suture" (Willett, 1948: 19). The two type specimens were collected by George P. Kanakoff; Willett's description of *Chrysallida elsiae*, along with three other species, was published posthumously.

George Willett (1879-1945) was born in Ontario, Canada, and moved to Redlands, California, with his family in 1888, where his father Rev. George Willett had become the first minister of the city's Congregational Church. Young George's interest in natural history developed with the proverbial "experiences as a child" on the farms, rivers and woodland near his home. He enthusiastically collected birds' eggs from nests on cliffs he rappelled down and from islands he swam to. His first publication (Willett, 1895) was on ravens' eggs.

Willett's first job was on an orange ranch near San Bernardino, handling horses and mules. When he arrived in the Philippines as a Private in the 35th U.S. Voluntary Infantry, the Spanish-American War had already ended. After his honorable discharge from the U.S. military, he served as an officer in the Manila Police Department. Returning to southern California in 1901, he worked briefly with the U. S. Biological Survey (U.S.B.S.) and then became a six-foot-three-inch 250-pound patrolman for the Los Angeles Police Force "for several years, part of the time as sergeant of the Chinatown squad. In the work he won the lasting confidence and friendship of many of the Chinese, and throughout his later years enjoyed the occasional opportunities to meet with them in their 'Tong' gatherings" (Elsie Chace, 1946: 101).

He joined the Cooper Ornithological Club in 1905, and his scientific study of birds developed rapidly. He was in the field (Channel Islands, southern California, and Baja California) whenever his police duties allowed. In 1912 he re-joined the U.S.B.S., traveling to the Hawaiian Islands (where he skinned out a rare monk seal on the beach at Laysan and shook land snails out of their trees on Oahu) and Alaska. He decided to make a living in Alaska by hunting in the winter and fishing in the summer. Two years were enough, and in 1921 he became Deputy U.S. Marshal at Craig and Ketchikan, Alaska. In the winter of 1926-1927 he and his wife Ora moved south, and in February 1927 he began his association with the Los Angeles County Museum (now the Natural History Museum of Los Angeles County), first as Assistant Ornithologist and then head of the Department of Ornithology and Mammalogy. He published widely on birds and mammals and Recent and fossil mollusks.

"In mollusks, George Willett found a group requiring detailed research, where new forms were still to be encountered and described. North American ornithology had reached the saturation point as far as new species to be discovered, and the prevailing interest had centered in splitting into subspecies, a concern for which Willett had little interest or sympathy. The study of mollusks, therefore, as a field still to be explored, held great attraction for him and formed the basis of a large part of his later published work" (Howard, 1946: 60). Like Bartsch, his last publication was on fossil pyramidellids, but with a species named for one of the Chaces.

His colleague at the LA Museum Hildegarde Howard (1946) published an exquisite tribute/obituary about him in *The Condor*, the journal of the Cooper Ornithological Club. Elsie Chace (1946) remembered him as a President of the Conchological Club of Southern California and presented a bibliography of his molluscan works (but without his posthumous 1948 paper, in which he had named *Odostomia elsiae*).

Gastropoda - Heterobranchia - Eupulmonata - Stylommatophora - Helminthoglyptidae
Herpeteros chaceorum (Willett, 1940) (Figures 29 and 30a-d)

Originally *Micrarionta chacei* Willett, 1940. See Bertsch (2022) for taxonomic history and emendation of genitive ending.

This helminthoglyptid snail is known only from a few individuals found at or near the type locality, the lower end of El Tigre Canyon, 9 miles north of Ensenada, Baja California (see map in Smith et al., 1990: 139). Near the small rancho/vineyard named El Tigre east of Salsipuedes (31º 57' 14.92" N; 116º 44' 55.64" W), there is a creek that creates a canyon that goes down to unite with the Arroyo Del Carmen, near highway 3. Near here, either at the El Tigre ranch or where the highway crosses over the El Tigre Creek close to the Del Carmen Creek, would have been the easiest access to the canyon in 1937 from what was the original road through the area. One the way back from Ensenada in spring 1937, the Chaces "stopped to hunt land snails on a rocky hillside in the lower part of El Tigre Canyon. In an hour's hunting and turning many rocks we found one each of the two common snails of this area and one empty shell of a *Micrarionta* that appeared to be a new species. In 1940 we visited this place again and, with Dr. Gregg to help, we found sufficient material so that Mr. Geo. Willett described it and gave it the name *Micrarionta chacei*" (Chace, 1967: 19).

This species has a relatively high-spired shell, with 5-5 1/4 whorls (Figures 1 and 2, holotype and label). The umbilicus is almost entirely covered by the expanded columella. The thin, polished periostracum is a buffy brown, encircled by a conspicuous dark brown band about 1-1.5 mm in width. The shell can reach 22 mm in diameter.

Gastropoda - Heterobranchia - Eupulmonata - Stylommatophora - Bradybaenidae
Monadenia chaceana Berry, 1940 (Figures 31 and 32a-c)

This beautiful chestnut-brown shell has a smooth, glossy surface. The periostracum is encircled by a conspicuous dark brown band about 2 mm wide just above the periphery that is bordered on each side by a narrower yellowish band. Shell with 5 ½ to 6 whorls, "low domed to moderately raised; embryonic whorls not notably projecting" (Roth, 2014). A moderate columellar flare covers only the edge of the open, steep-walled umbilicus. About 18-26 mm in diameter.

The type specimen was collected 29 September 1937 by Emery P. Chace, "among rocks about half-way up a spur of Badger Mt. on west side of Shasta River Canyon not far above its mouth, Siskiyou County, California" (Berry, 1940: 10).

Monadenia chaceana is endemic to northern California (Siskiyou County) and southwest Oregon (Jackson and Klamath Counties). Within this limited range, it lives in forested and open-talus rocky areas. "The species is normally crepuscular (active during dawn and dusk) during the spring and fall seasons when humidity is high. During the wet seasons, it may be found away from rock refugia, foraging for green vegetation and fruit, feces, old leaves, leaf mold and fungi.... Arboreal foliose lichens are an important food source.... During the summer and winter, snails become dormant and may be found deep within stable accumulations of rocks, which serve as refuge from desiccation, and protection from predators...Species with flat profiles, such as *M. chaceana*, may be more efficient at utilizing narrow fissures in rock than some higher-domed species" (Weasma & Duncan, 2005: 8).

This eponymous species is named "for Mr. And Mrs. Emery P. Chace, whose work in the field continues to be of significant consequence in improving our understanding of the Californian land-snail fauna" (Berry, 1940: 11).

Polyplacophora - Chitonida - Mopaliidae
* *Mopalia chacei* Berry, 1919

= *Mopalia porifera* Pilsbry, 1893 (Figures 33 and 34)

This species ranges from Bolinas Bay, California (Pilsbry's type locality) to Rancho Socorro (now known as El Socorro or Socorrito, about 18 miles south of San Quintín, Baja California. It has been reported to be more common in northern Baja California (Eernisse et al., 2007). Berry's (1919) specimen was collected from La Jolla, California.

The plates are gray-green with brown flecking. "Head valve with ten beaded ribs, intermediate valves with convex sides, central areas with closely spaced longitudinal ridges, spaces between pitted; lateral areas with two prominent beaded ribs. Girdle spicular, with scattered, minutely branched setae" (McLean, 1978: 63). Adults range from 15-22 mm in length.

Polyplacophora - Chitonida - Ischnochitonidae
Ischnochiton chaceorum Kaas & van Belle, 1990 (Figures 35 and 36)

This small, rare chiton has a brownish tegument that is vaguely blotched with lighter or darker tones. Maximum known size is 7 mm long, by 4.5 mm in width. The animal is "moderately elevated (dorsal elevation c. 0.34), carinated, side slopes slightly convex, valves not beaked, lateral areas hardly or not raised, poorly defined. Tegmentum evenly, quincuncially microgranulose, in the end valves and lateral areas of the larger specimens a weak radial ribbing can be observed" (Kaas & Van Belle, 1990: 167). It is distinguished from other northeastern Pacific species of the genus "by the combination of its most striking characteristics: the carinated back of the shell, the evenly quincuncially microgranulose tegmentum, the strongly anteriorly situated mucro of the tail valve, the scantly ribbed dorsal girdle scales, and the bicuspid major lateral radula teeth" (Kaas & Van Belle, 1990: 169).

The type material consists of 18 specimens collected by Emery Chace in February 1957. The Chaces (1967: 31) describe this field trip: "This year started early with a six day trip to Cholla Bay, near Punta Penasco, Mexico. Big sand flats in the bay and plenty of rocky coast just the other side of Pelican Point. One of the shells that was new to us was *Crassispira bottae* which we found in the small channels in the rock ledges that were exposed at low tide." They make no mention of the chiton specimens. Keen (1971: 715) regards *Crassispira bottae* Valenciennes in Kiener, 1839, as a junior synonym of *Crassispira incrassata* (Sowerby, 1834), which ranges from the head of the Gulf of California to the Gulf Guayaquil, Ecuador.

To date *Ischnochiton chaceorum* is known only from its type locality, Cholla Bay, Puerto Peñasco, Sonora, México (Reyes-Gómez, 2016).

The Belgian amateur malacologists Richard A. Van Belle (1926-2005) and Pieter Kaas (1915-1996) met in 1975 and began a two decades-long collaboration, resulting in their naming 42 species of chitons together. They are best known for their 5-volume work *Catalogue of the Living Chitons* (1985-1994). Both amassed large personal collections of chiton specimens and literature. Van Belle was a scientific associate of the Royal Belgian Institute for Natural Sciences (Brussels), and Kaas was an honorary assistant at the Rijksmuseum van Natuurlijke Historie (National Museum of Natural History) in Leiden.

Van Belle was a teacher of physical education at the Royal Athenaeum in Sint-Niklass. During his career, Kaas worked variously as a radio and newspaper journalist, summer tour guide, secondary science schoolteacher. With his wife Miep, he authored over 300 children's books.

A Personal Note

For more than a decade, I have had the honor of knowing Paul G. Chace, grandson of Emery and Elsie. He is an archaeologist, historian, and Trustee of the San Diego Presidio Heritage Trust. We met through our shared interests in the peoples and cultures of the Californias. He has been very generous in sharing information and documents about his grandparents.

I corresponded several times with his brother Roger, who sent me the image of Elsie as a young lady. Sadly, Roger Chace passed away on 30 December 2021.

Although I never met Emery and Elsie, I was privileged to be accepted as a colleague by a number of their associates, including Allyn G. Smith, A. Myra Keen, Rudolf Stohler, and William K. Emerson.

Sharing such personal relationships is one of the richest rewards of historical research.

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Literature Cited

Akins, D.B. & W.J. Bauer Jr. 2021. We Are the Land: A History of Native California. University of California Press, Oakland. xv + 358 pp.

Anonymous. 1956. An eminent company of amateur naturalists: part-time scientists add to man's store of knowledge. Life 41(11): 143-150. (September 10, 1956)

Anonymous. 1975. Elsie Margaret Chace. The Festivus 6(3): 13.

Anonymous. 1980. In Memoriam Emery P. Chace 1882-1980. The Festivus 12(7): 91.

Baker, H.B. 1958. Henry Augustus Pilsbry. The Nautilus 71(3): 73-83.

Bartsch, P. 1927. New west American marine mollusks. Proceedings of the United States National Museum 70(2660): 1-36.

Bartsch, P. 1955. The pyramidellid mollusks of the Pliocene deposits of North St. Petersburg, Florida. Smithsonian Miscellaneous Collections 125(2): iii + 102 pp.

Behrens, D.W. & A. Hermosillo. 2005. Eastern Pacific Nudibranchs, A Guide to the Opisthobranchs from Alaska to Central America. Sea Challengers, Monterey. vi + 137 pp.

Bergh, R. 1897. Malacologische Untersuchungen: Die Pleurobranchiden. In Dr. Carl Gottfried, Reisen im Archipel der Philippinen. Siebenter Band, Vierte Abtheilung, Erste Lieferung. Wiesbaden, C. W. Kreidel's Verlag: 51 pp.

Bergh, R. 1902. Malacologische Untersuchungen: Ascoglossa. Aplysiidae. In Dr. Carl Gottfried, Reisen im Archipel der Philippinen. Siebenter Band, Vierte Abtheilung, Vierter Abschnitt.. Wiesbaden, C. W. Kreidel's Verlag: pp. 313-382.

Berry, S.S. 1919. Preliminary notes on some new west American chitons. Lorquinia 2(6): 4-7.

Berry, S.S. 1940. Five new snails of the genus *Monadenia.* Journal of Entomology and Zoology 32(1): 1-17.

Berry, S.S. 1941. New Mollusca from the Pleistocene of San Pedro, California–II. Bulletins of American Paleontology 27(101): 1-20.

Berry, S.S., C.L. Hubbs, H. Bertsch & D.J. Eernisse. 2019. The distribution, past and present, of *Cryptochiton.* Western Society of Malacologists, Annual Report 49: 18-19.

Bertsch, H. 2014. *Doris montereyensis* and *Peltodoris nobilis* (Gastropoda: Nudipleura) in Mexico: eliminating political boundaries in marine biogeography. The Festivus 45(4): 113-114.

Bertsch, H. 2015. Plants & vertebrates, bugs & slugs: the crossing geographic and taxonomic paths of five naturalists. Western Society of Malacologists, Annual Report 45: 18-20.

Bertsch, H. 2021. The "Cactus Man" and his clams: Charles Russell Orcutt, *Coralliochama orcutti* and *Chlamydoconcha orcutti*. The Festivus 53(4): 318-327.

Bertsch, H. 2022. *Herpeteros chaceorum*: genitive-ending emendation of *Micrarionta chacei* Willett, 1940 (Gastropoda: Heterobranchia: Eupulmonata: Stylommatophora. The Festivus 54(1):63-64.

Bertsch, H. & T.M. Gosliner. 1986. Anatomy, distribution, synonymy, and systematic relationships of *Atagema alba* (O'Donoghue, 1927) (Nudibranchia: Doridacea). The Veliger 29(1): 123-128.

Blainville, H. M. D. de. 1824. Mollusques, Mollusca (Malacoz.), pp. 1-392. In: Dictionnaire des Sciences Naturelles (F. Cuvier, ed.), vol. 32. Levrault, Strasbourg et Paris, & Le Normant, Paris.

Burch, J.Q. 1944. No title. Minutes of the Conchological Club of Southern California 37: 18-19.

Burch, J.Q. 1946. Subgenus *Chrysallida*. Minutes of the Conchological Club of Southern California 61: 36-38.

Carpenter, P.P. 1857. Catalogue of the Collection of Mazatlan shells, in the British Museum: collected by Frederick Reigen. British Museum, London. 552 pp.

Carpenter, P.P. 1864. Supplementary report on the present state of our knowledge with regard to the Mollusca of the west coast of North America. Report to the British Association for the Advancement of Sciences, 1863. Taylor & Francis, pp. 517-686.

Chace, E.M. 1946. George Willett. The Nautilus 59(3): 101-104.

Chace, E.M. 1948. The Chace's 1948 vacation trip. Minutes of the Conchological Club of Southern California 83: 5-6.

Chace, E.P. 1956. Additional notes on the Pliocene and Pleistocene fauna of the Turtle Bay area, Baja California. Transactions of the San Diego Society of Natural History 12(9): 177-180.

Chace, E.P. 1958a. The marine molluscan fauna of Guadalupe Island, Mexico. Transactions of the San Diego Society of Natural History 12(19): 31-332.

Chace, E.P. 1958b. A new mollusk from San Felipe, Baja California. Transactions of the San Diego Society of Natural History 12(20): 333-334.

Chace, E.P. 1967. Conchological Reminiscences: Recollections of Emery P. Chace and Elsie M. Chace, with the help of our notebooks. Issued with the aid of the San Diego Society of Natural History. 38 pp.

Chace, E.P. & W.K. Emerson. 1959. Pleistocene mollusks from Tecolote Creek, San Diego, California. Transactions of the San Diego Society of Natural History 12(21): 335-346.

Cheney, H.W. 1997. Shell seekers: behind the scenes at the Museum of Natural History, malacologists ponder a major collection of mollusks and their shells. Santa Barbara Magazine, Spring 1997: 54-59.

Coan, E.V., P. Valentich Scott & F.R. Bernard. 2000. Bivalve Seashells of Western North America: Marine Bivalve Mollusks from Arctic Alaska to Baja California. Santa Barbara Museum of Natural History, Santa Barbara. viii + 764 pp.

Cockerell, T.D.A. 1938. Junius Henderson. The Nautilus 51(3): 97-99.

Cockerell, T.D.A. & C.N. Eliot. 1905. Notes on a collection of Californian nudibranchs. Journal of Malacology 12(3): 31-53.

Cuvier, G. 1804. Mémoire sur la phyllidie et le pleurobranche. Annales du Muséum d'Histoire Naturelle. 5: 266-276.

Dall, W.H. 1900. A new species of *Pleurobranchus* from California. The Nautilus 14(8): 92-93.

Dall, W.H. 1909. Ludwig Rudolph Sophus Bergh [sic]. Science 30(766): 304

Dall, W.H. 1916. Diagnoses of new species of marine bivalve mollusks from the northwest coast of America in the collection of the United States National Museum. United States National Museum, Proceedings 52(2183): 393-417.

Dawson, E.Y. 1946. Marine algae associated with upwelling along the northwestern coast of Baja California, Mexico. Bulletin of the Southern California Academy of Sciences 44(3): 57-71.

Dawson, E.Y. 1951. A further study of upwelling and associated vegetation along Pacific Baja California, Mexico: ibid., vol. 10, p. 39-58.

Dees, R. In preparation. Who Are They? Commemorative Molluscan Genera and Species Names, Alaska to Baja California.

Draper, B. 1987. Lost Operculum Club List of Champions. The Conchological Club of Southern California: 43 pp.

Duncan, N. 2008. Survey Protocol for Aquatic Mollusk Species: Preliminary Inventory and Presence/Absence Sampling, Version 3.1. Portland, Oregon. Interagency Special Status/Sensitive Species Program. U.S. Department of Interior, Bureau of Land Management, Oregon/Washington and U.S. Department of Agriculture, Forest Service, Region 6. 52 pp.

DuShane, H. 1979. The family Epitoniidae (Mollusca: Gastropoda) in the northeastern Pacific. The Veliger 22(2): 91-134.

Eernisse, D.J., R.N. Clark & A. Draeger. 2007. Polyplacophora. In: J.T. Carlton (ed.), The Light and Smith Manual. Intertidal invertebrates from Central California to Oregon, 4th edition. University of California Press, Berkeley. pp. 701-713.

Emerson, W.K. 1956a. Upwelling and associated marine life along Pacific Baja California, Mexico. Journal of Paleontology 30(2): 393-397.

Emerson, W.K. 1956b. Pleistocene invertebrates from Punta China, Baja California, Mexico, with remarks on the composition of the Pacific Coast Quaternary Fauna. Bulletin of the American Museum of Natural History 111(4): 313-342.

Ghanimi, H., J.H.R. Goddard, A. Chichvarkhin, T.M. Gosliner, D.W. Jung & Á. Valdés. 2020. An integrative approach to the systematics of the *Berthella californica* complex (Heterobranchia: Pleurobranchidae). Journal of Molluscan Studies 86(3): 186-200.

Hanselman, V. 1971. About the Chaces. The Festivus 2(2): 6-7.

Henderson, J. 1935. West American species of *Goniobasis*, with descriptions of new forms. The Nautilus 48(4): 130-134.

Hertlein, L.G. & A.M. Strong. 1951. Eastern Pacific expeditions of the New York Zoological Society. XLIII. Mollusks from the West Coast of Mexico and Central America. Part X. Zoologica (Scientific Contributions of the New York Zoological Society) 36(2): 67-120.

Hertz, C. 1984. Illustration of the types named by S. Stillman Berry in his "Leaflets in Malacology." The Festivus 15(Supplement): 42 pp.

Howard, F.B. 1961. Range extension for *Trivia elsiae* Howard & Sphon. The Veliger 4(1): 50.

Howard, F.B. 1970. Emery P. and Elsie M. Chace, keepers of the tin book. The Tabulata 3(1): 11-15.

Howard, F.B. 1975. Elsie M. Chace 1885-1975. Of Sea and Shore 6(2): 117.

Howard, F.B. & G.G. Sphon, Jr. 1960. A new Panamic species of *Trivia*. The Veliger 3(2): 41-43.

Howard, H. 1946. George Willett: May 28, 1879–August 2, 1945. The Condor 48(2): 49-71.

Hubbs, C.L. 1959. Quarternary paleoclimatology of the Pacific Coast of North America. California Cooperative Oceanic Fisheries Investigations, Reports Volume 7: 105-112.

Jordan, S.F., S. Jepsen & R. Huff. 2013. Species fact sheet, *Pomatiopsis chacei*. Xerces Society. 17 pp.

Kaas, P. & R.A. Van Belle. 1990. Monograph of Living Chitons (Mollusca: Polyplacophora). Vol. 4. Suborder Ischnochitonina: Ischnochitonidae: Ischnochitoninae. (cont.). Addition to vols. 1, 2and 3. E.J. Brill Backhuys, Leiden. 298 pp.

Keen, A.M. 1971. Sea Shells from Tropical West America. Marine Mollusks from Baja California to Peru, 2nd edition. Stanford University Press, Stanford. xiv + 1064 pp.

Keen, A.M. 1981. *In Memoriam*: Emery P. Chace (1882-1980). Western Society of Malacologists, Annual Report 13: 19-20.

Lance, J.R. 1966. New distributional records of some northeastern Pacific Opisthobranchiata (Mollusca: Gastropoda) with descriptions of two new species. The Veliger 9(1): 69-81.

MacFarland, F.M. 1966. Studies of opisthobranchiate mollusks of the Pacific coast of North America. Memoirs of the California Academy of Sciences 6:1-546.

Martin, C. 1972. Know your fellow club members. The Festivus 3(11): 7-13.

McLean, J.H. 1978. Marine Shells of Southern California. Natural History Museum of Los Angeles County, Science Series 24: 104 pp.

McLean, J.H. 1996. The Prosobranchia. In: Taxonomic Atlas of the Benthic Fauna of the Santa Maria Basin and Western Santa Barbara Channel. The Mollusca Part 2 – The Gastropoda. Santa Barbara Museum of Natural History. volume 9: 1–160.

Mörch, O.A.L. 1875. Synopsis familiae Scalidarum Indiarum occidentalium. Oversigt over Vestindies Scalarier. Videnskabelige Meddelelser fra den Naturhistoriske forening I Kjöbenhaven 1874(17): 250-268.

Odhner, N.H. 1926. Die Opisthobranchien. Further zoological results of the Swedish Antarctic expedition 1901-1903 under the direction of D. Otto Nordenskjöld, vol. 2, no. 1: 1-100.

Oldroyd, I.S. 1927. The Marine Shells of the Coast of North America. Stanford University Publications, Geological Series 2(2): 304 pp.

Parker, K.V.W. 1958. Type specimens of marine Mollusca described by P.P. Carpenter from the west coast (San Diego to British Columbia). The Geological Society of America, Memoir 76: vi + 376 pp.

Pilsbry, H.A. 1893. Manual of Conchology, vol. XIV (Part 56): Polyplacophora, (Chitons) Lepidopleuridae, Ischnochitonidae, Chitonidae, Mopaliidae. Academy of Natural Sciences, Philadelphia. pp. 209-350.

Pilsbry, H.A. 1937. A Californian *Pomatiopsis*. The Nautilus 50(3): 84-85.

Reyes-Gómez, A. 2016. Chitons: the Polyplacophora from the Mexican Pacific. The Festivus, Special Issue Supplement 2016: 50 pp.

Rochebrune, A.T. de. 1895. Diagnose de mollusques nouveaux, provenant du voyage de M. Diguet en Basse Californie. Bulletin du Muséum National d'Histoire Naturelle, Paris 1(6):239-243.

Rosenberg, G. 2011. A boreal affair: *Acirsa borealis* (Lyell, 1841) and *Opalia borealis* (Gould, 1852) (Mollusca: Epitoniidae). Proceedings of the Academy of Natural Sciences of Philadelphia 161(1), 97-103.

Roth, B. 2014. Identification and distribution of the land snail Monadenia chaceana and similar species. A Report in Partial Fulfillment of USDA Forest Service Purchase Order AG-046W-P-12-0110. 40 + 6 + 6 pp.

Ruhoff, F.A. 1973. Bibliography and zoological taxa of Paul Bartsch, with a biographical sketch by Harald A. Rehder. Smithsonian Contributions to Zoology 143: v + 166 pp.

Shimek, R.L. 1983. Biology of the northwestern Pacific Turridae. I. *Ophiodermella.* Malacologia 23(2): 281-312.

Smith, A.G., W.B. Miller, C.C. Christensen & B. Roth. 1990. Land Mollusca of Baja California, Mexico. Proceedings of the California Academy of Sciences 47(4): 95-158.

Strong, A.M. 1937. Notes on West Coast Epitoniidae. The Nautilus 51(1): 4-8.

Strong, A.M. 1946. Key to *Chrysallida*. Minutes of the Conchological Club of Southern California 61: 8-10.

Sweeney, M.L. & C.F.E. Roper. 1984. The zoological taxa and bibliography of S. Stillman Berry. American Malacological Bulletin 3(1): 63-82.

Thiele, J. 1931. Handbuch der systematischen Weichtierkunde. Band 2, teil 3: 779-1022. Gustav Fischer, Jena.

Turner, R.D. 1955. The family Pholadidae in the western Atlantic and the eastern Pacific. Part II. – Martesiinae, Jounnetiinae and Xylophaginae. Johnsonia 3(34): 65-160.

Unger, S. 2014. Qaqamiiĝux. Traditional Foods and Recipes from the Aleutian and Pribilof Islands. Aleutian Pribilof Islands Association, Inc., Anchorage. 381 pp.

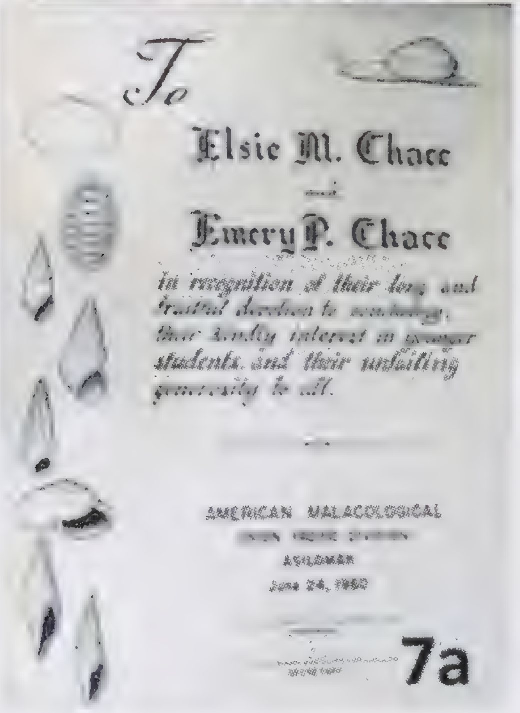
Warén, A., B.L. Burch & T.A. Burch. 1984. Description of five new species of Eulimidae. The Veliger 26(3): 170-178.

Weasma, T.R. & N. Duncan. 2005. Conservation assessment for *Monadenia* (*Shastelix*) *chaceana*, Chace sideband. USDA Forest Service Region 6 and USDI Bureau of Land Management, Oregon and Washington. 16 pp.

Willett, G. 1895. The Mexican raven in California. Oologist 12: 110-111.

Willett, G. 1940. A new land shell from Lower California. Bulletin of the Southern Academy of Sciences 39(1): 80-82.

Willett, G. 1948. Four new gastropods from the Upper Pleistocene of Newport Bay Mesa, Orange county, California. Bulletin of the Southern California Academy of Sciences 47(1): 17-21.



To

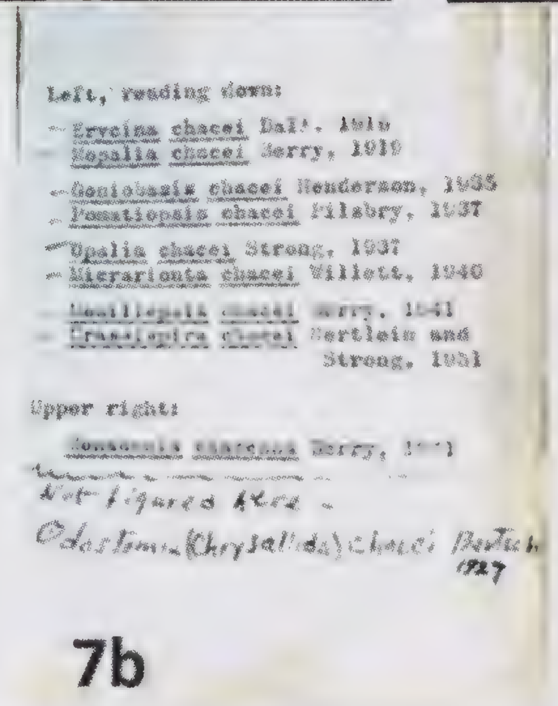
Elsie M. Chace

and

Emery P. Chace

in recognition of their long and fruitful devotion to conchology, their kindly interest in younger students and their unfailing generosity to all.

AMERICAN MALACOLOGICAL
UNION PACIFIC DIVISION
ASILOMAR
June 24, 1960



Left, reading down:

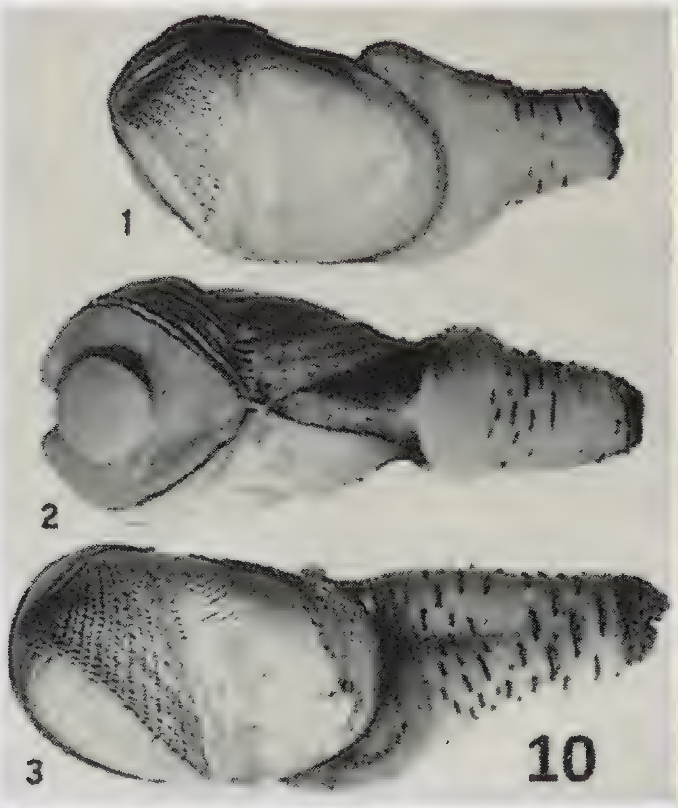
- Erycina chacei Dall, 1916
- Mopalia chacei Berry, 1919
- Goniobasis chacei Henderson, 1935
- Pomatiopsis chacei Pilsbry, 1937
- Opalia chacei Strong, 1937
- Micrarionta chacei Willett, 1940
- [illegible] chacei Berry, 1941
- Crassispira chacei Hertlein and Strong, 1951

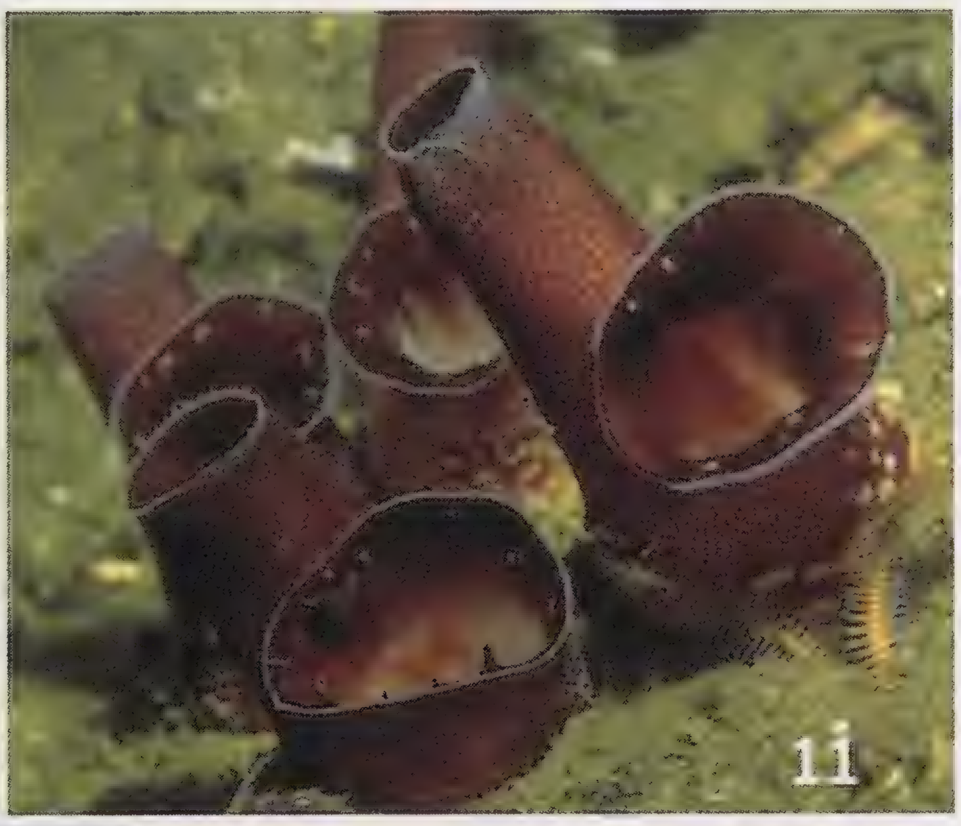
Upper right:

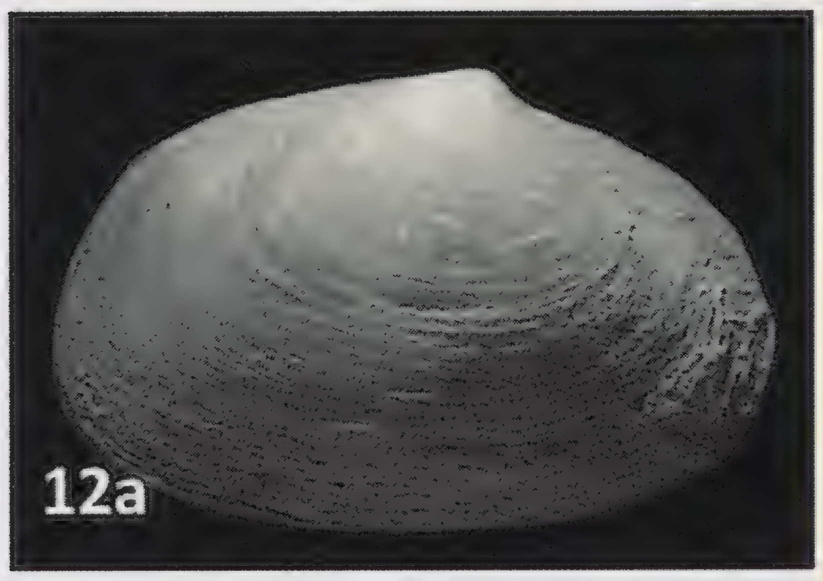
[illegible] Berry, [illegible]

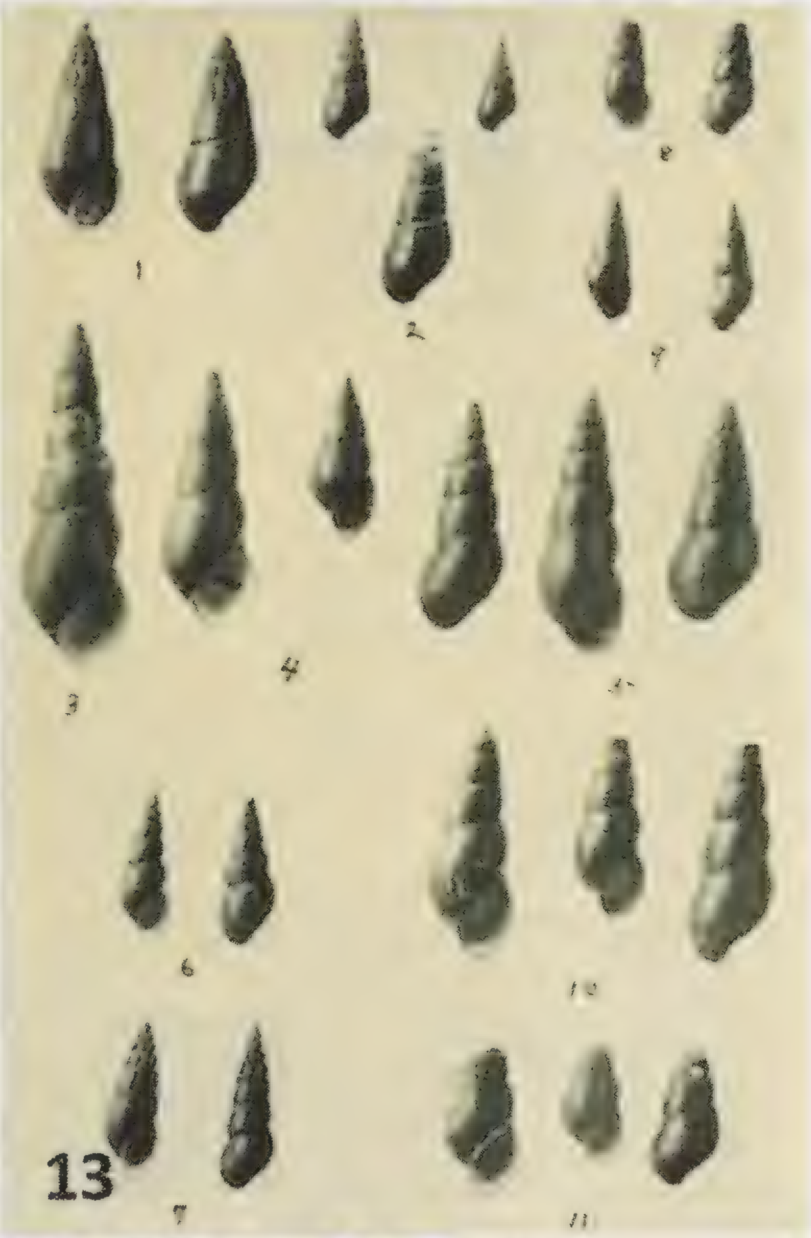
Not figured here –
Odostomia (Chrysallida) chacei Bartsch 1927

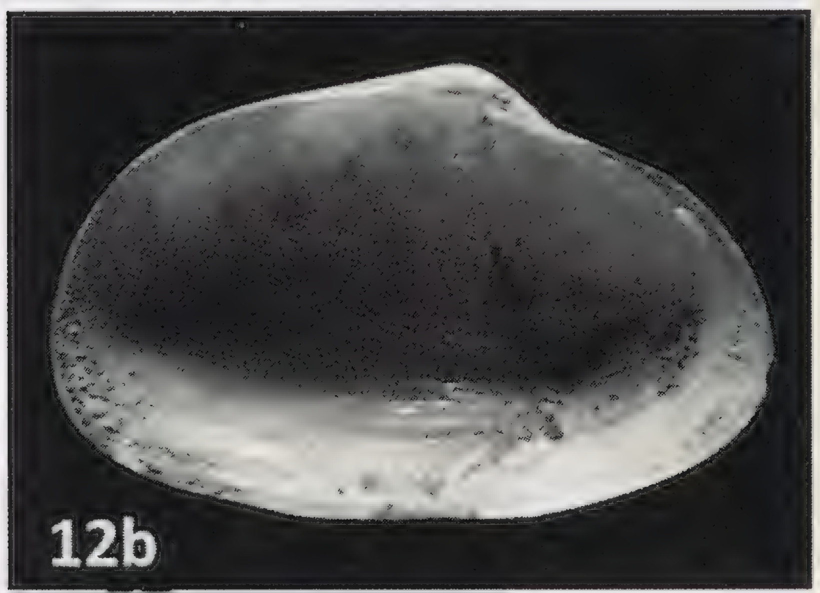
Plate 1. Figure 1. Elsie Chace as a young lady; no date. Photo courtesy of Roger Chace (†30 December 2021), her grandson. **Figure 2.** Emery Chace with backpack, ready for intertidal collecting; no date. Photo from Chace, 1967. **Figure 3.** Emery and Elsie Chace with Ida Shepard Oldroyd; Palo Alto, 1933. Photo from the Archives of the SDSC. **Figure 4.** Emery Chace curating shell collection at the SDNHM; 1950s. Photo courtesy Ariel Hammond, from the Archives of the SDNHM. **Figure 5.** Elsie Chace, AMU-PD meeting; San Diego, June 1965. Photo courtesy of Vanessa Delnavaz, from the Archives of the SBMNH. **Figure 6.** Emery Chace, AMU-PD meeting; San Diego, June 1965. Photo courtesy of Vanessa Delnavaz, from the Archives of the SBMNH. **Figure 7a.** Award of Honor presented to Elsie M. and Emery P. Chace; AMU-PD, 1960. Image courtesy of grandson Paul Chace. **Figure 7b.** List of eponymous species illustrated in the Award of Honor, AMU-PD, 1960, by Emery Chace. Image courtesy of Paul Chace. **Figure 8.** Emery and Elsie Chace with daughter Ruth French; Lomita, California, December 1970. Photo from the Archives of the SDSC. **Figure 9.** Emery Chace; no date. Photo courtesy of Roger Chace.

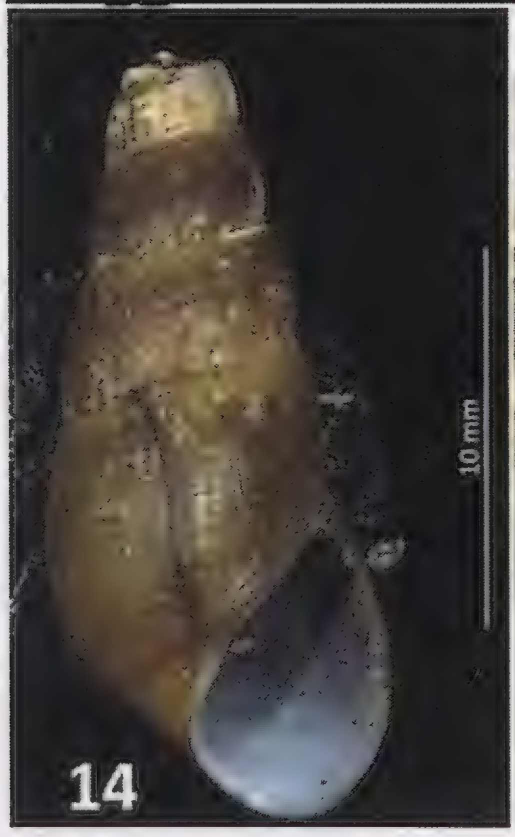












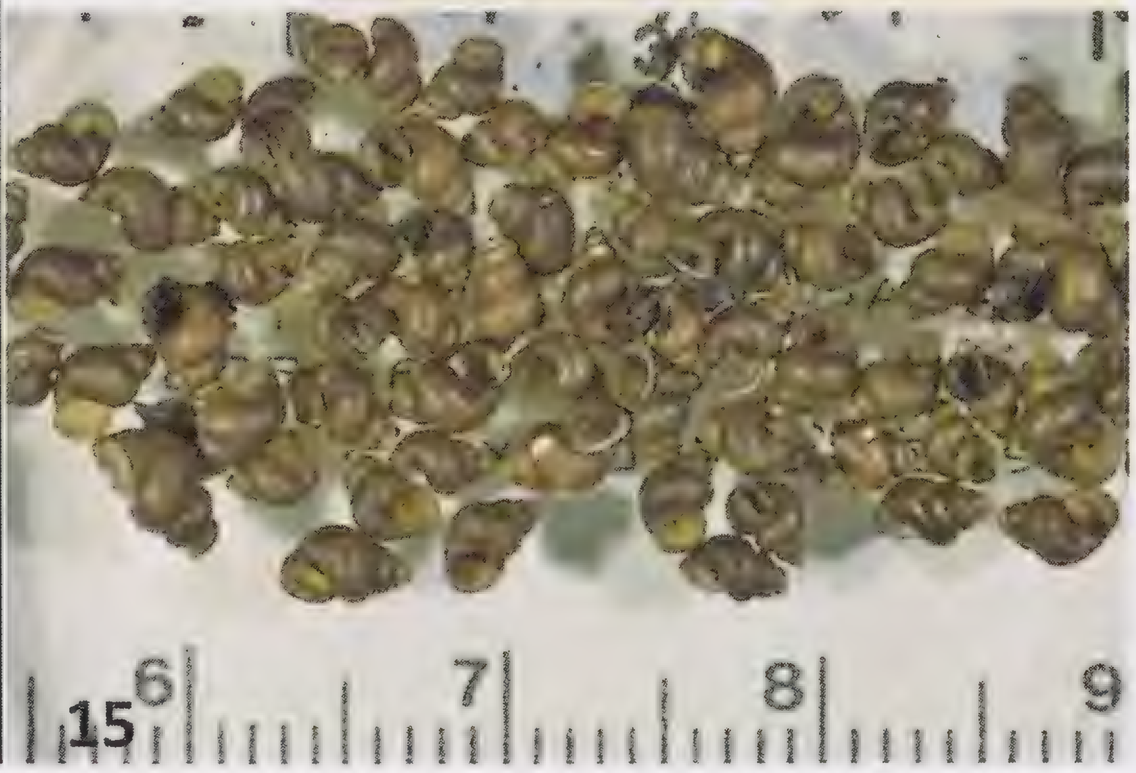
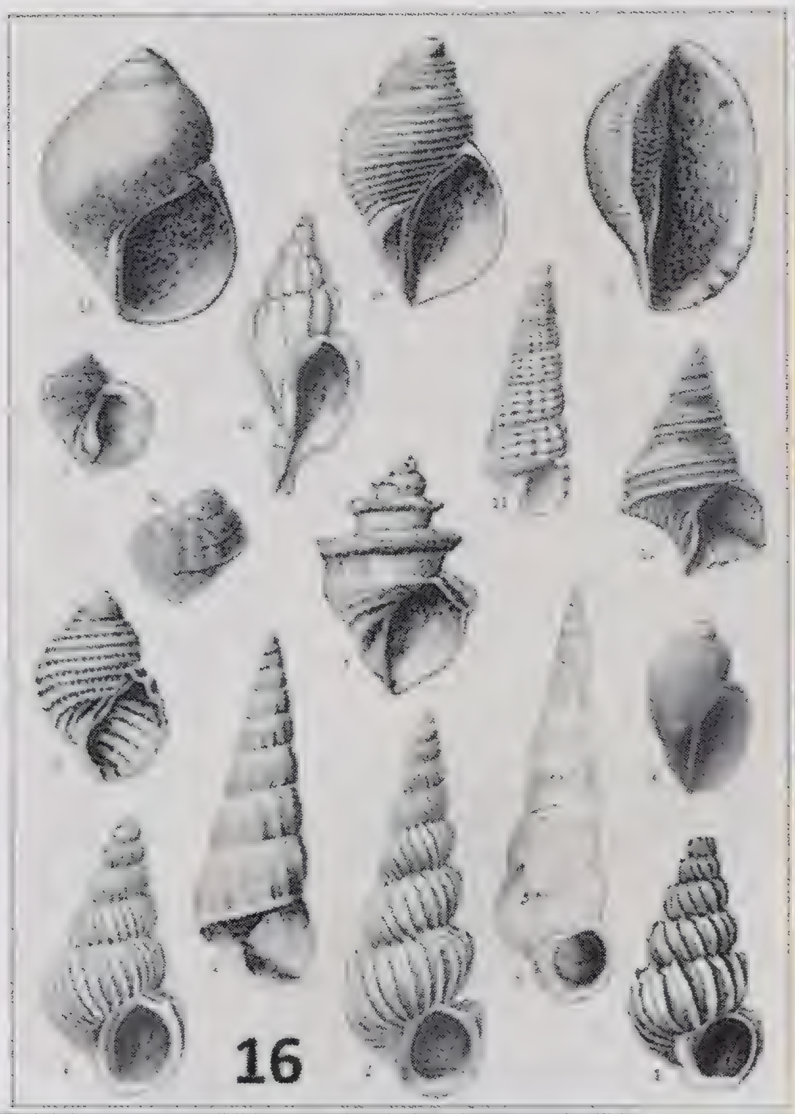
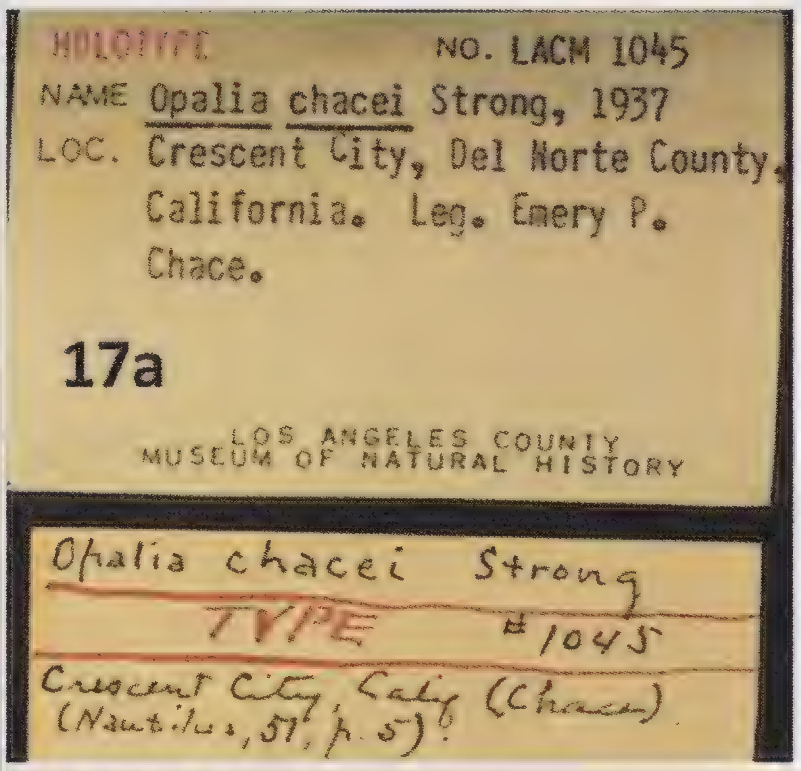


Plate 2. **Figure 10.** *Chaceia* Turner, 1955: plate 38. **Figure 11.** *Chaceia ovoidea* (Gould, 1851). In situ photograph of siphons by Daniel W. Gotshall. **Figure 12a.** *Neaeromya rugifera* (Carpenter, 1864). Exterior view of shell. Photo by Paul Valentich-Scott. **Figure 12b.** *Neaeromya rugifera*. Interior view of shell. Photo by Paul Valentich-Scott. **Figure 13.** *Juga chacei* (Henderson, 1935): plate 4, figures 8 and 9. **Figure 14.** *Juga chacei*. Catalogue No. 672038, SBMNH. Collected by Emery P. Chace, Huichi Bridge, South River, Del Norte County, California, August 1937. Photo by Daniel Geiger. **Figure 15.** *Pomatiopsis chacei* Pilsbry, 1937. Catalogue No. LACM 181667. Collected by Emery P. Chace, at Wilson Creek, Del Norte County, CA, 1933. Photo by Lindsey Groves.

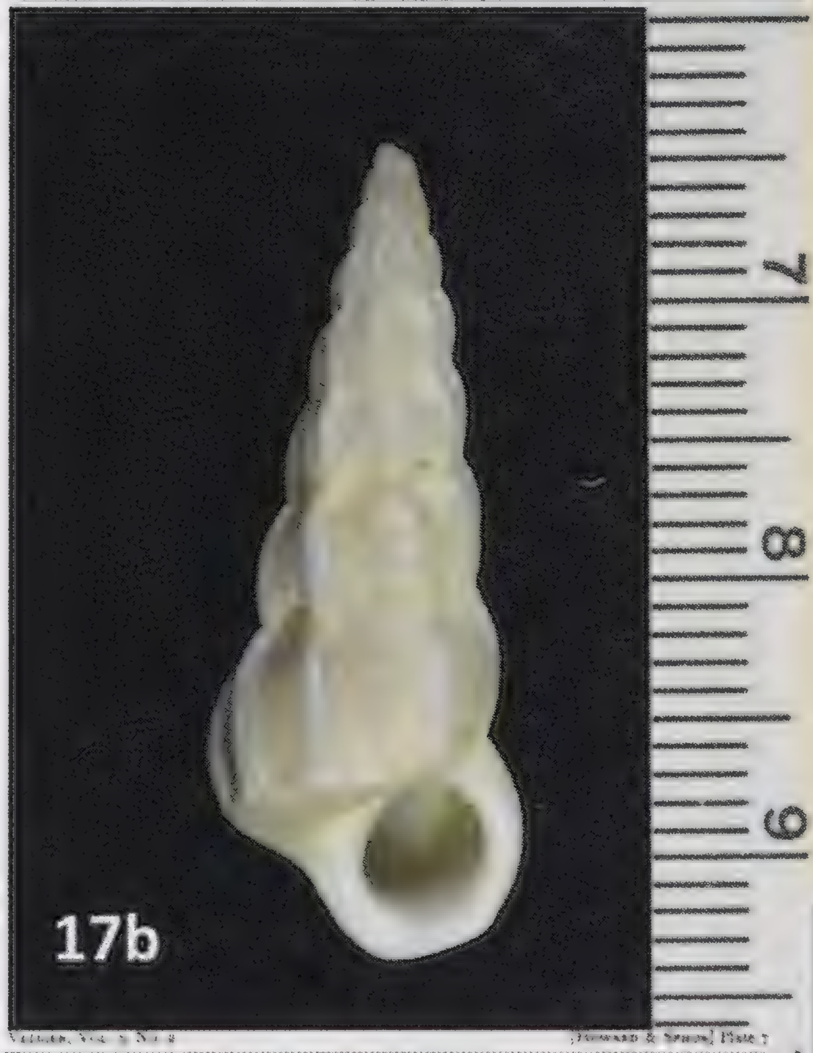


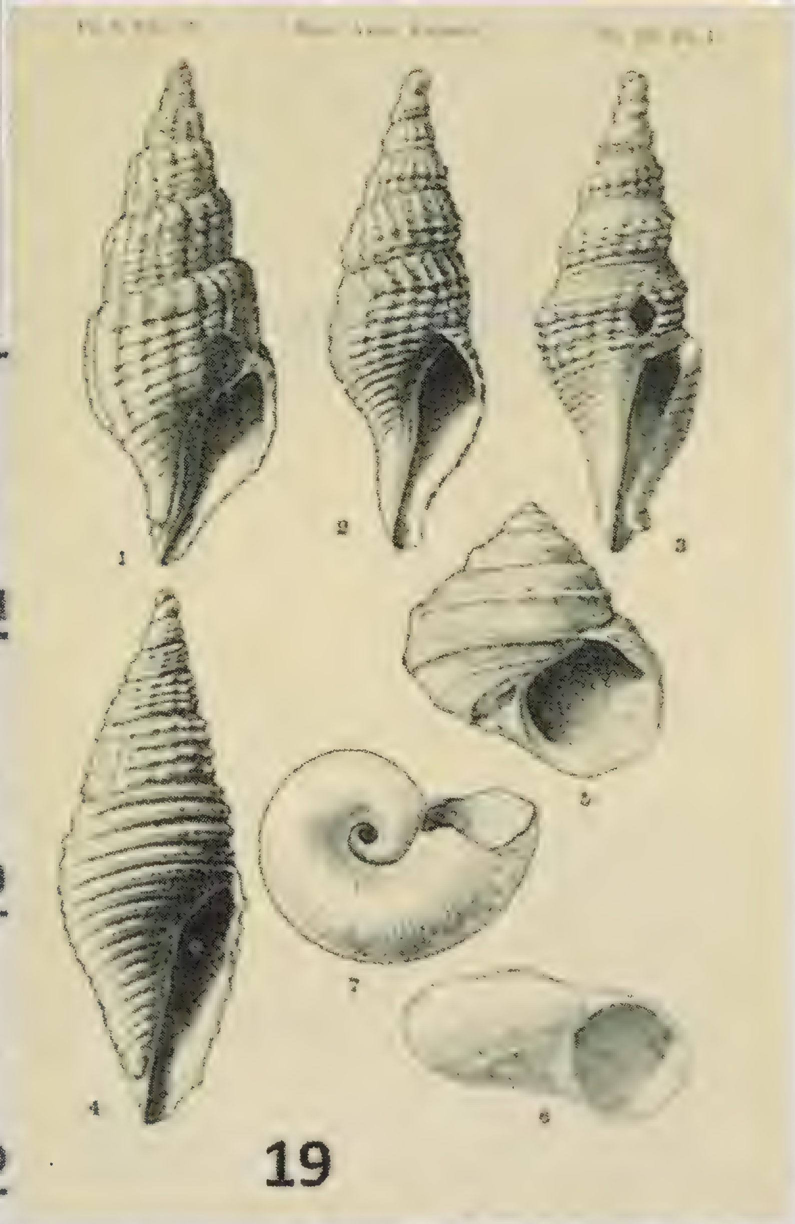


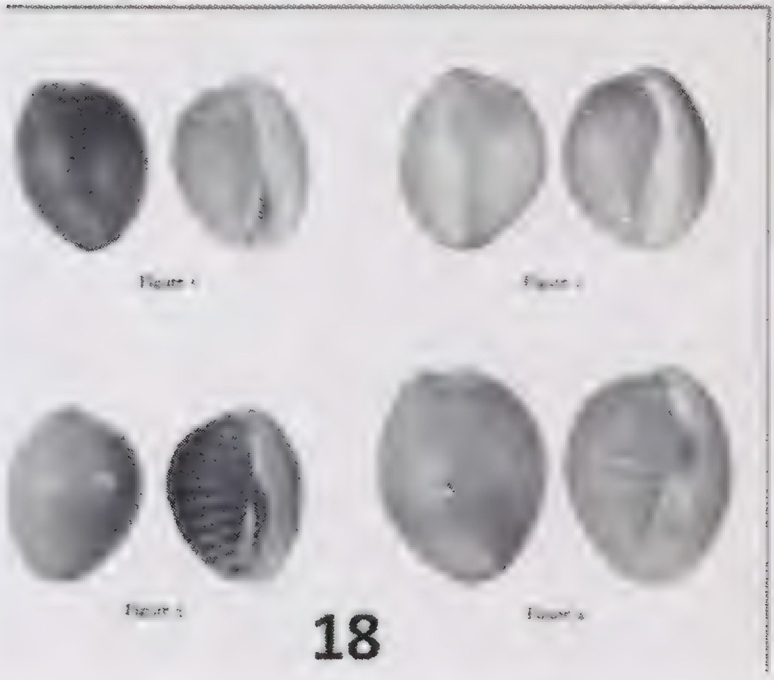
HOLOTYPE NO. LACM 1045
NAME Opalia chacei Strong, 1937
LOC. Crescent City, Del Norte County, California. Leg. Emery P. Chace.

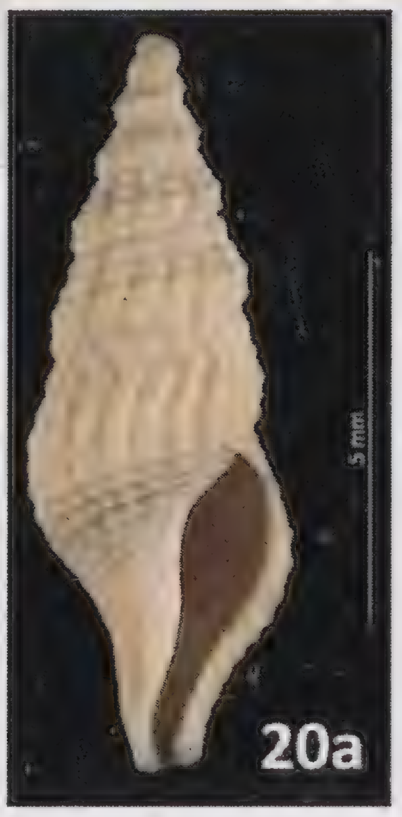
LOS ANGELES COUNTY
MUSEUM OF NATURAL HISTORY

Opalia chacei Strong
TYPE #1045
Crescent City, Calif (Chace)
(Nautilus, 51, p. 5)









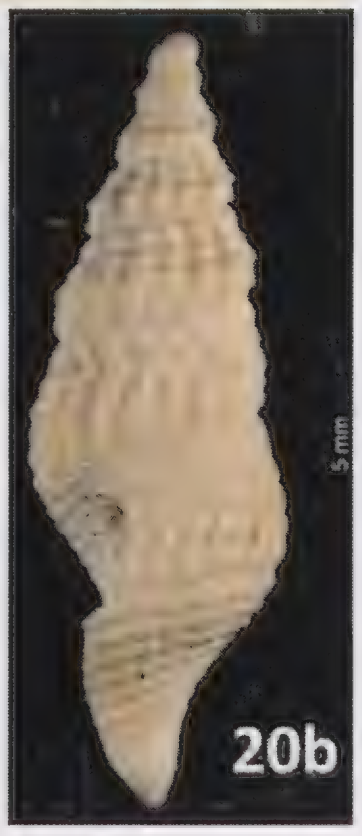
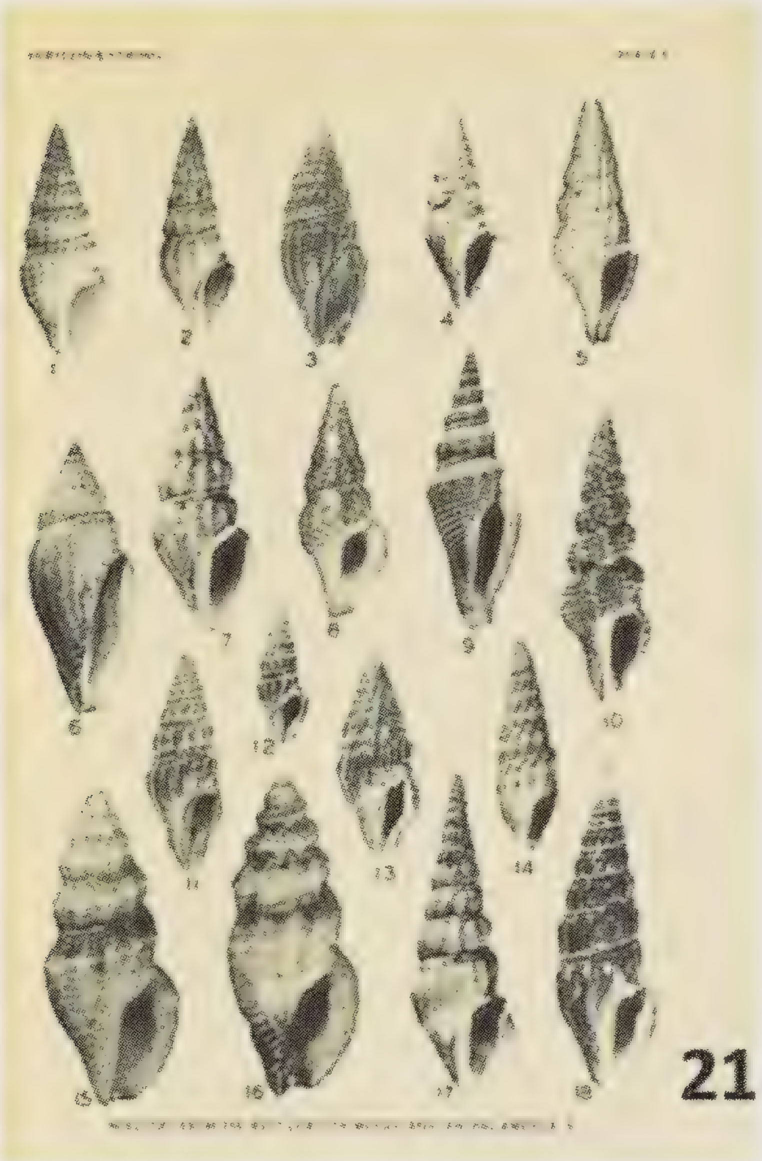


Plate 3. Figure 16. *Opalia wroblewski* (Mörch, 1875). Image from Oldroyd, 1927: plate 31, figure 5. **Figure 17a.** Labels of holotype specimen of *Opalia chacei* Strong, 1937, Holotype Collection No. LACM 1045. Photo by Lindsey Groves. **Figure 17b.** Holotype specimen of *Opalia chacei*. Catalogue No. LACM 1045. Photo by Lindsey Groves. **Figure 18.** *Pusula elsiae* (Howard & Sphon, 1960): plate 7, figures 1-4. **Figure 19**. *Moniliopsis chacei* Berry, 1941 [= *Ophiodermella cancellata* (Carpenter, 1864)]. Image from original description by Berry, 1941: plate 1, figure 2. **Figure 20a.** Apertural view, holotype of *Moniliopsis chacei*. SBNHM Catalogue No. 34515, collected by S. Stillman Berry, Hilltop Quarry, San Pedro, CA, November 1935. Photo by Daniel Geiger. **Figure 20b.** Lateral view of holotype of *Moniliopsis chacei*. SBNHM Catalogue No. 13515. Photo by Daniel Geiger.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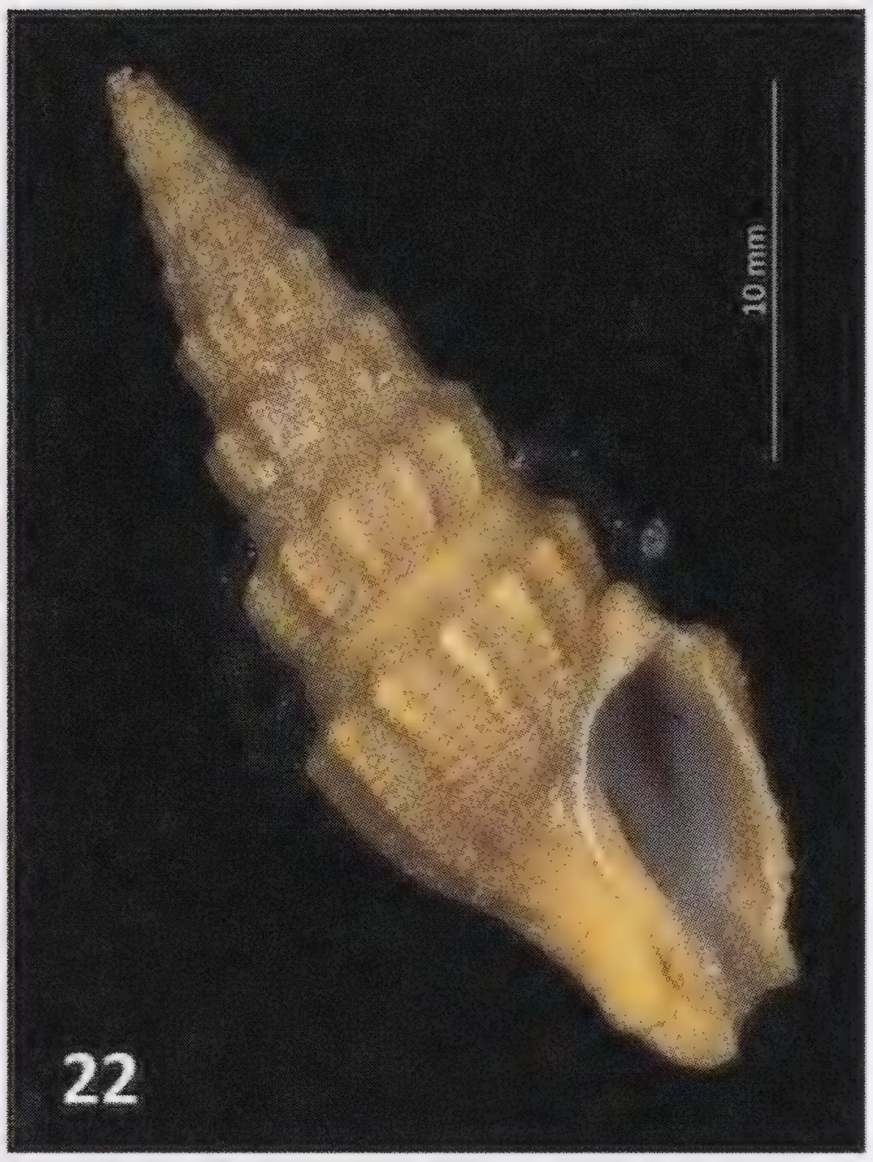

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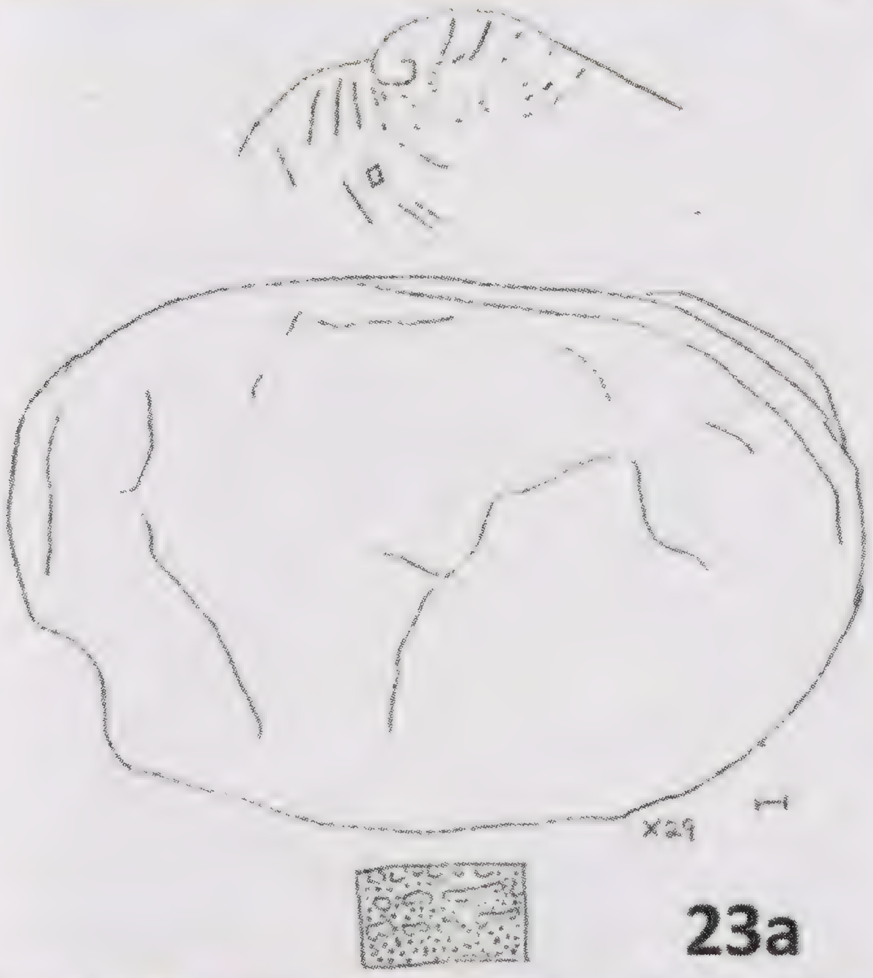
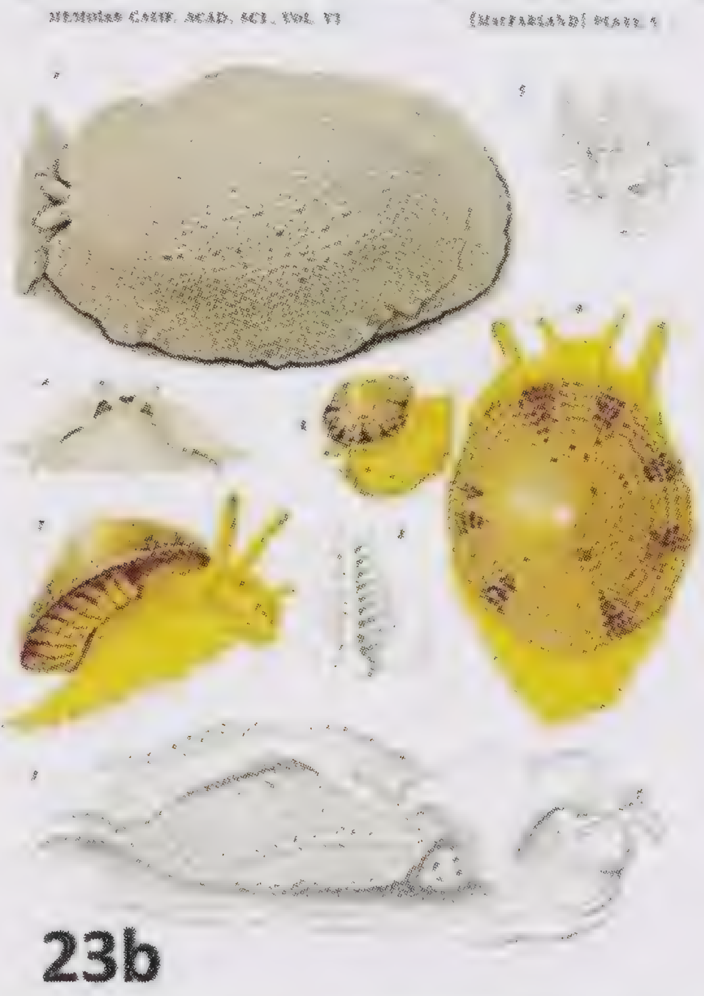
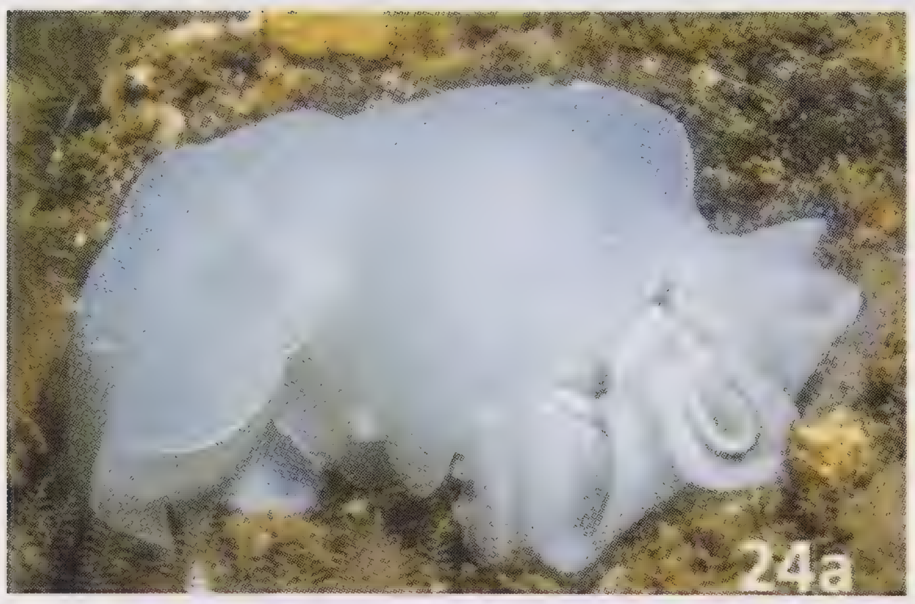
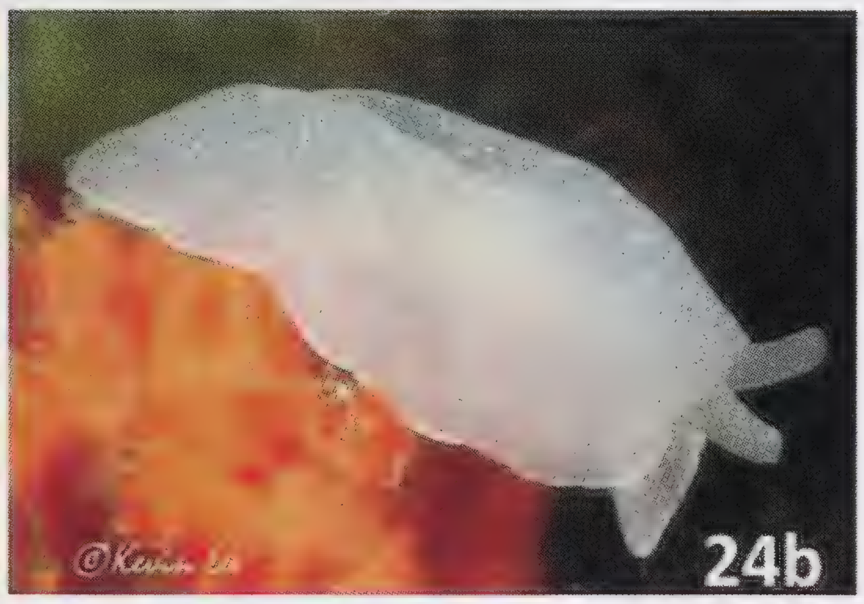


23a

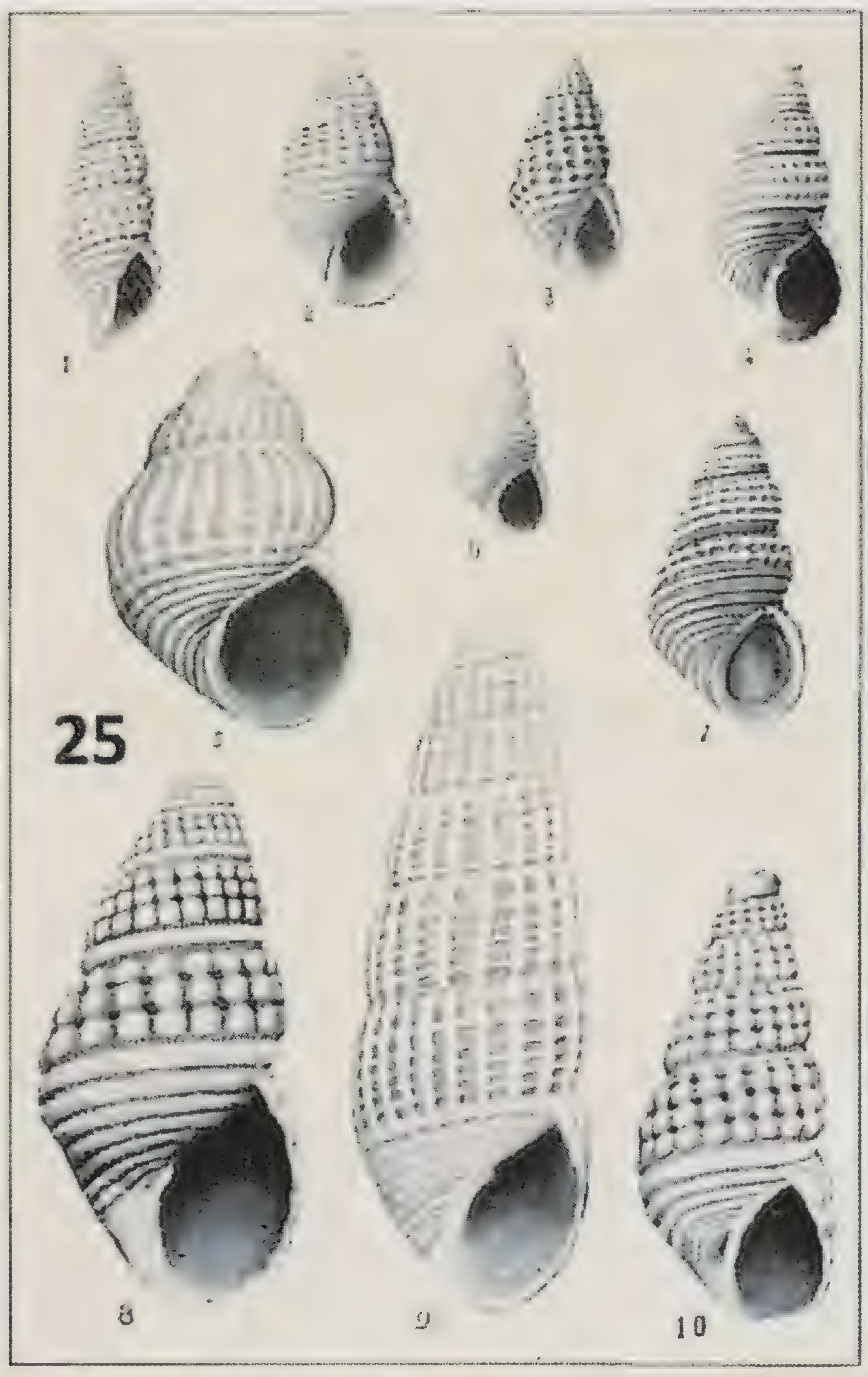

MEMOIRS CALIF. ACAD. SCI., VOL. VI
[MACFARLAND] PLATE 5
23b

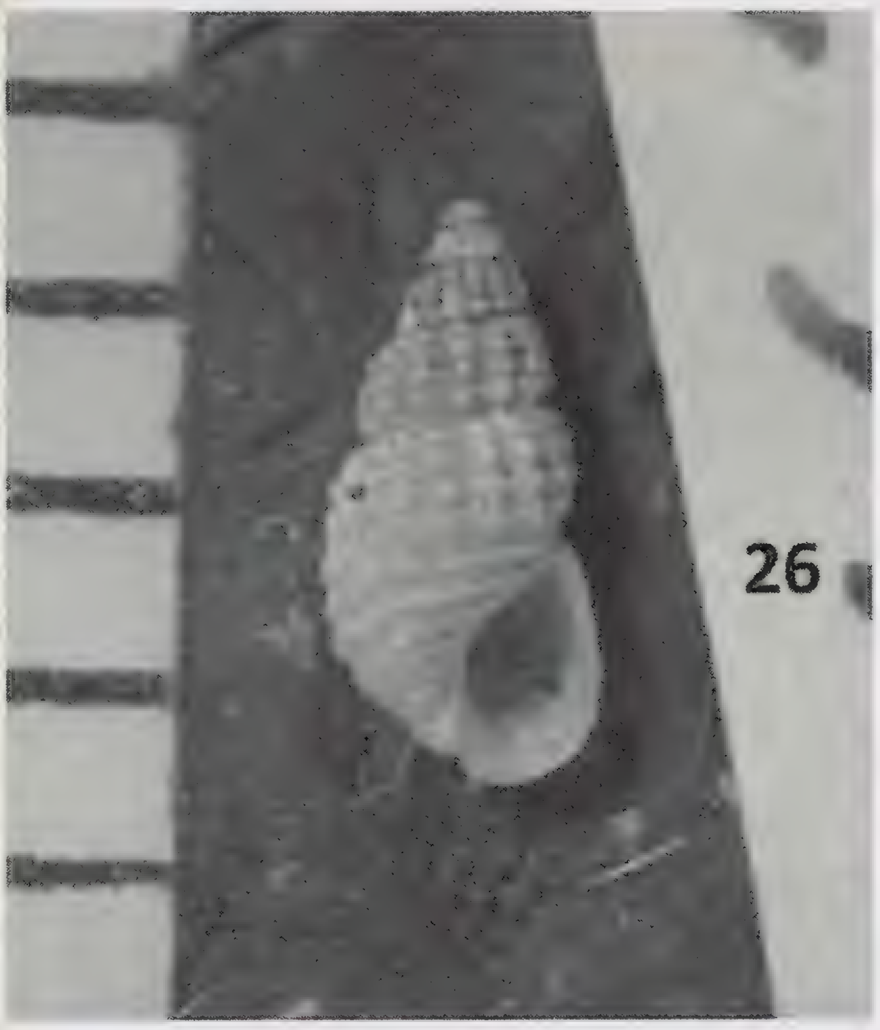

24a

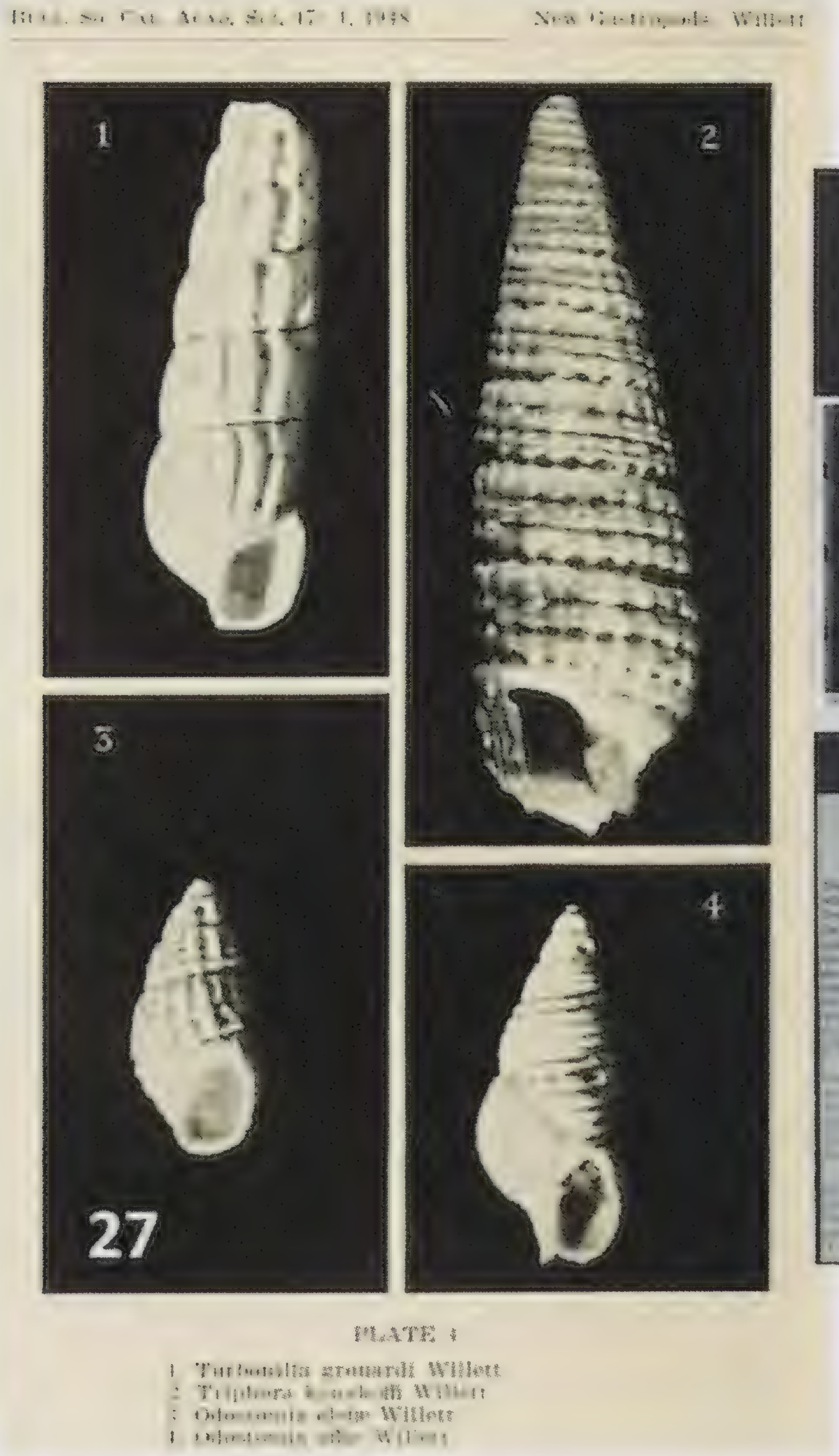


24b

Plate 4. Figure 21. *Crassispira chacei* Hertlein & Strong, 1951: plate I, figure 12. **Figure 22.** *Crassispira chacei.* SBMNH Catologue No. 672037. Collected by Robert Koch, 100-125 m deep, 5 miles southwest of Punta Doble, Guaymas, Sonora, Mexico, May 1985. Photo by Daniel Geiger. **Figure 23a.** Original illustration of shell of *Pleurobranchus chacei* Burch, 1944: page 7. **Figure 23b.** Original illustrations of *Pleurobranchus californicus denticulatus* MacFarland, 1966: plate 5, figures 1-5. **Figure 24a.** Two animals of *Berthella chacei* with egg mass. Photo by Craig Hoover, Point Lobos, CA. **Figure 24b.** Living *Berthella chacei*, approximately 20 mm in length. Photo by Kevin Lee, Malibu, CA.






Bull. So. Cal. Acad. Sci. 47(1), 1948
New Gastropods. Willett
1
2
3
4
27
PLATE 4
1 Turbonilla grouardi Willett
2 Triphora [illegible] Willett
3 Odostomia elsiae Willett
4 Odostomia [illegible] Willett

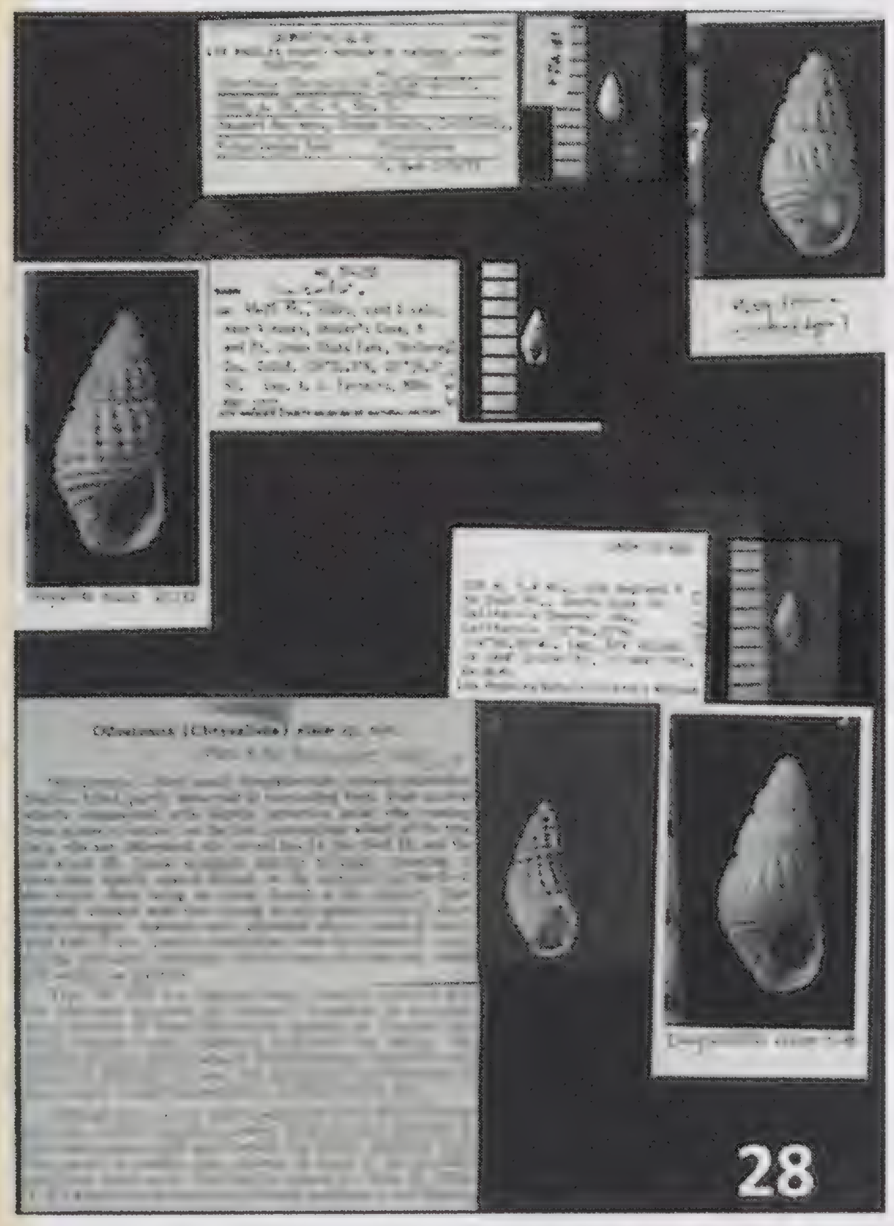


Plate 5. Figure 25. *Chrysallida chacei* (Bartsch, 1927): plate 3, figure 3. **Figure 26.** Holotype shell of *Chrysallida chacei*. USNM Catalogue No. 361626, collected by Emery P. Chace, Cayucos, San Luis Obispo County, CA. Photo by James H. McLean. **Figure 27.** *Chrysallida elsiae* (Willett, 1948): plate 4, figure 3. **Figure 28.** Information on *Chrysallida elsiae*, from the working notebooks of James H. McLean. Image courtesy of Lindsey Groves.

29

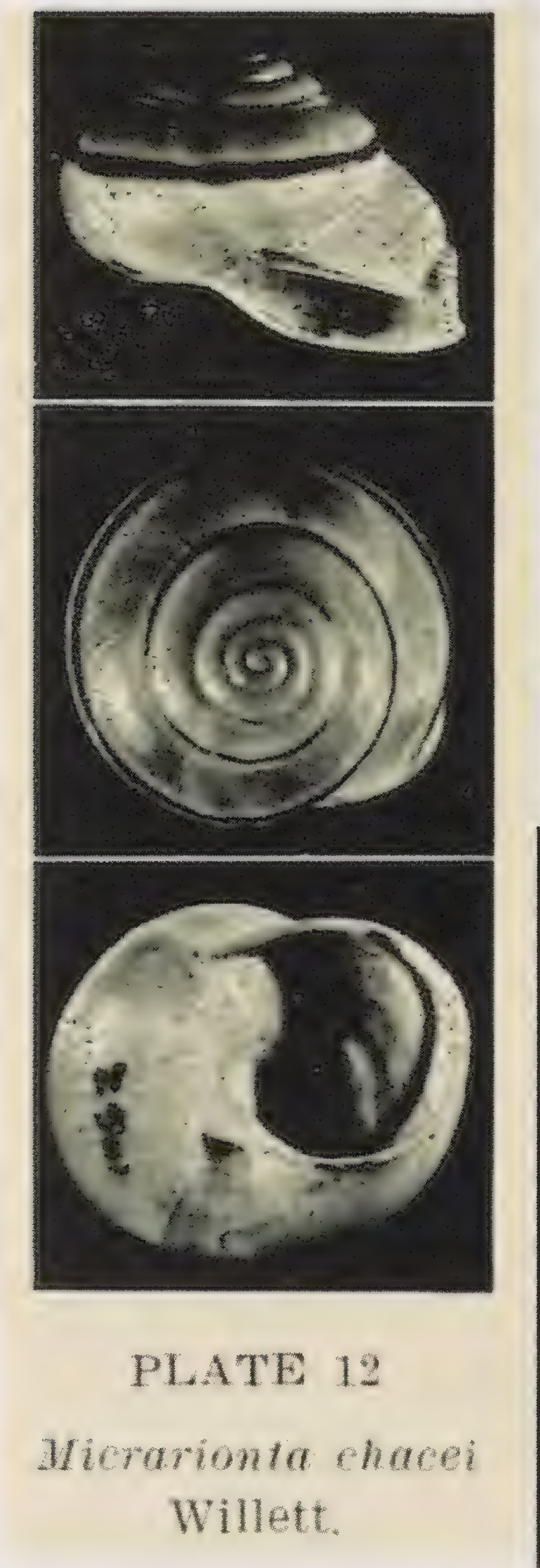
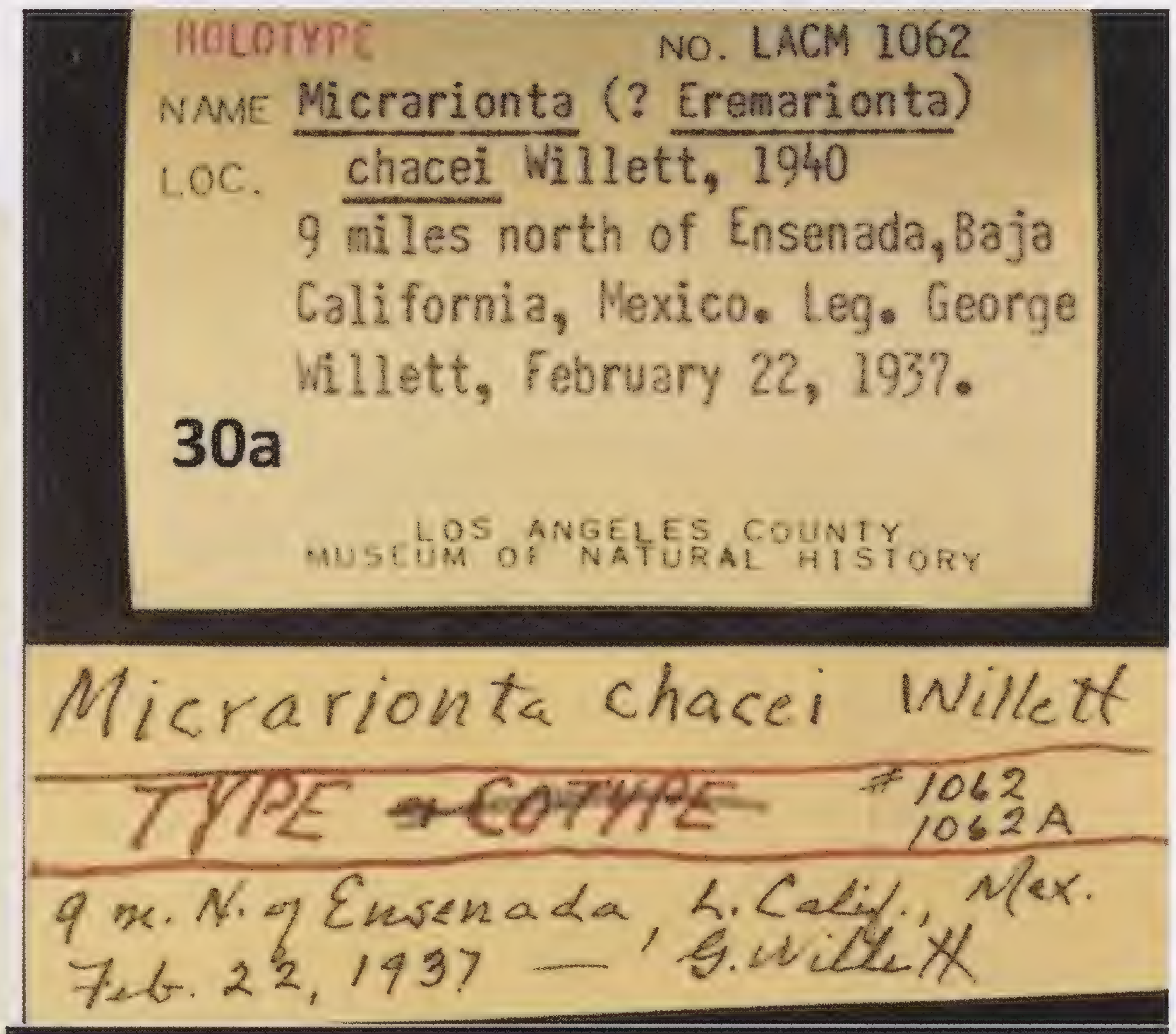


PLATE 12

Micrarionta chacei Willett.



HOLOTYPE NO. LACM 1062

NAME Micrarionta (? Eremarionta)

LOC. chacei Willett, 1940

9 miles north of Ensenada, Baja California, Mexico. Leg. George Willett, February 22, 1937.

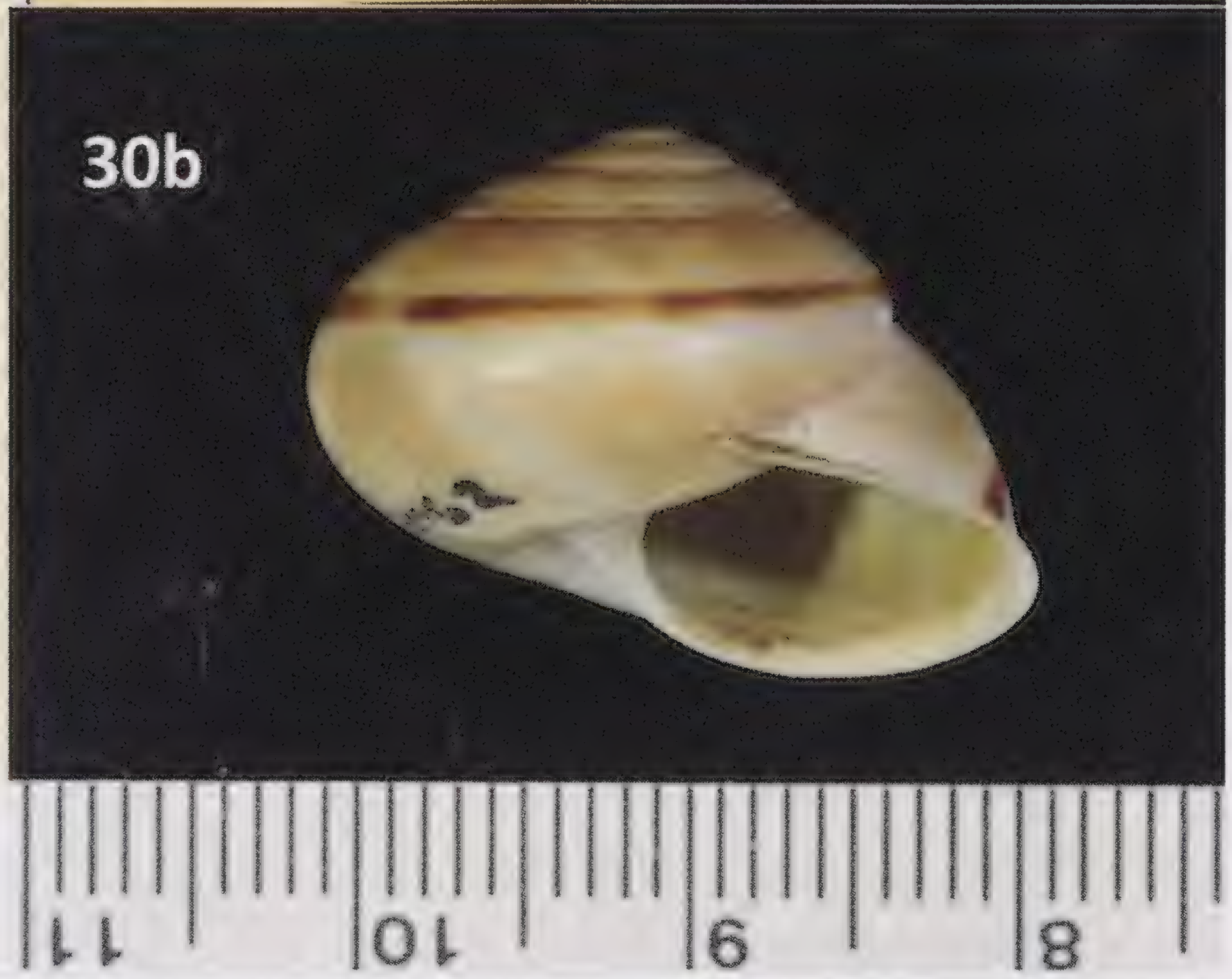
30a

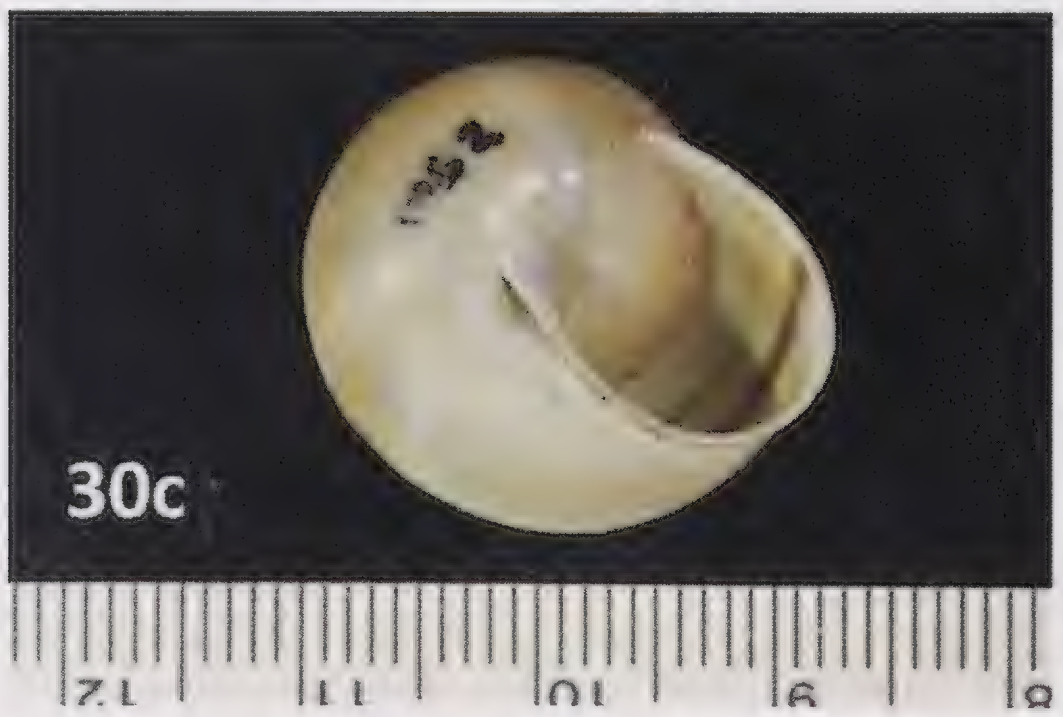
LOS ANGELES COUNTY
MUSEUM OF NATURAL HISTORY

Micrarionta chacei Willett

TYPE ~~& COTYPE~~ #1062
1062A

9 m. N. of Ensenada, L. Calif., Mex.
Feb. 22, 1937 — G. Willett





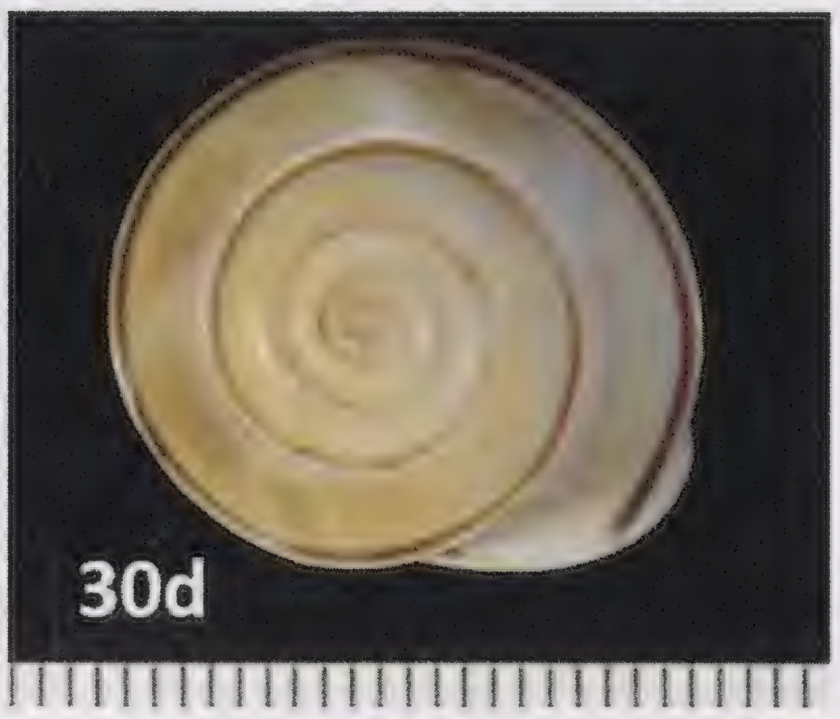
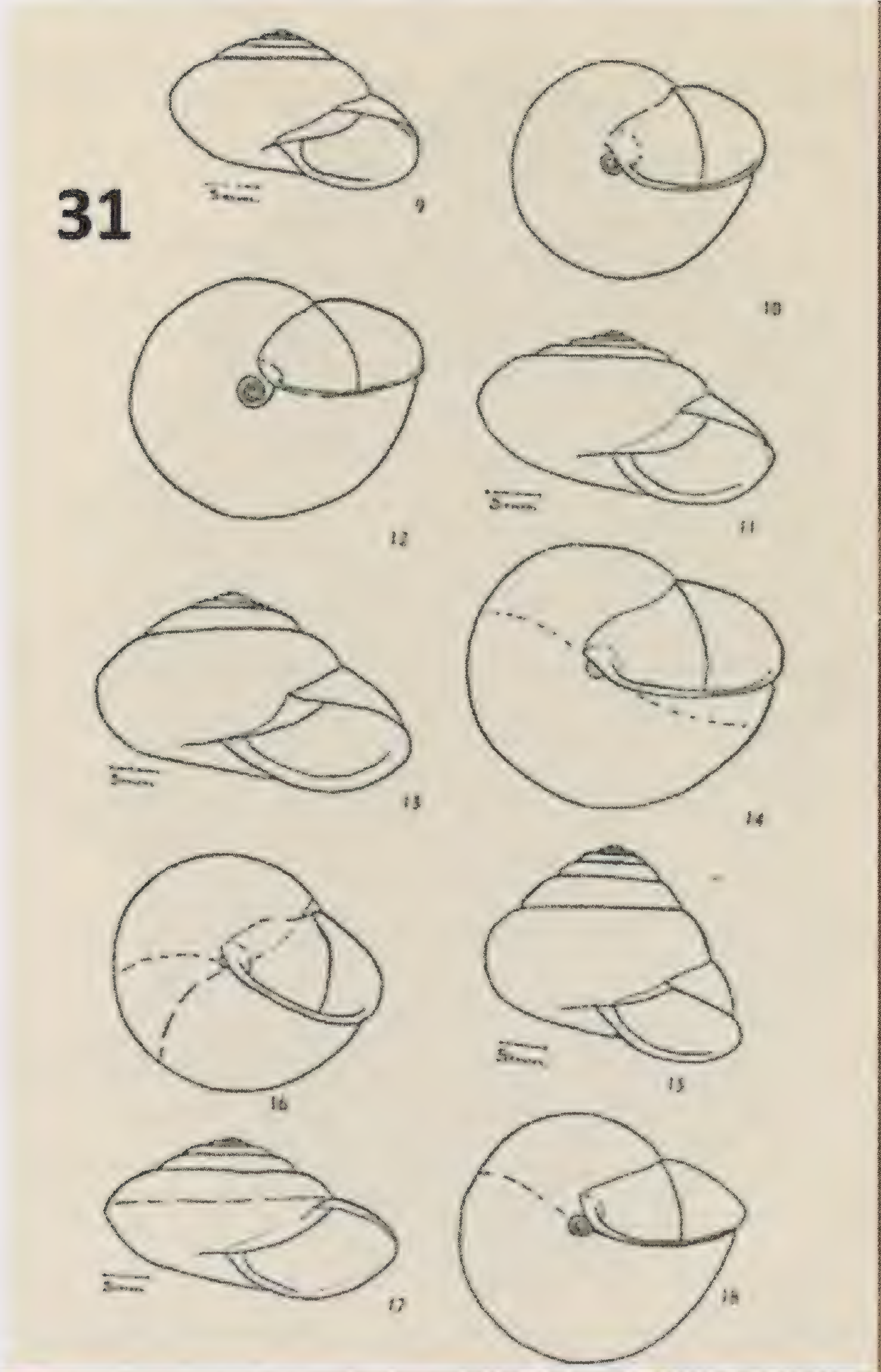


Plate 6. Figure 29. *Micrarionta chacei* = *Herpeteros chaceorum* (Willett, 1940): plate 12. **Figure 30a.** Label of holotype of *Micrarionta chacei*, LACM Catalogue No. 1062, collected by G. Willett, 9 miles north of Ensenada, BC, 22 February 1937. Image by Lindsey Groves. **Figure 30b.** Apertural view, holotype of *Micrarionta chacei* [= *Herpeteros chaceorum*)], LACM Catalogue No. 1062. Photo by Lindsey Groves. **Figure 30c.** Umbilical view of *Micrarionta chacei* holotype. Photo by Lindsey Groves. **Figure 30d.** Dorsal view of holotype of *Micrarionta chacei*. Photo by Lindsey Groves.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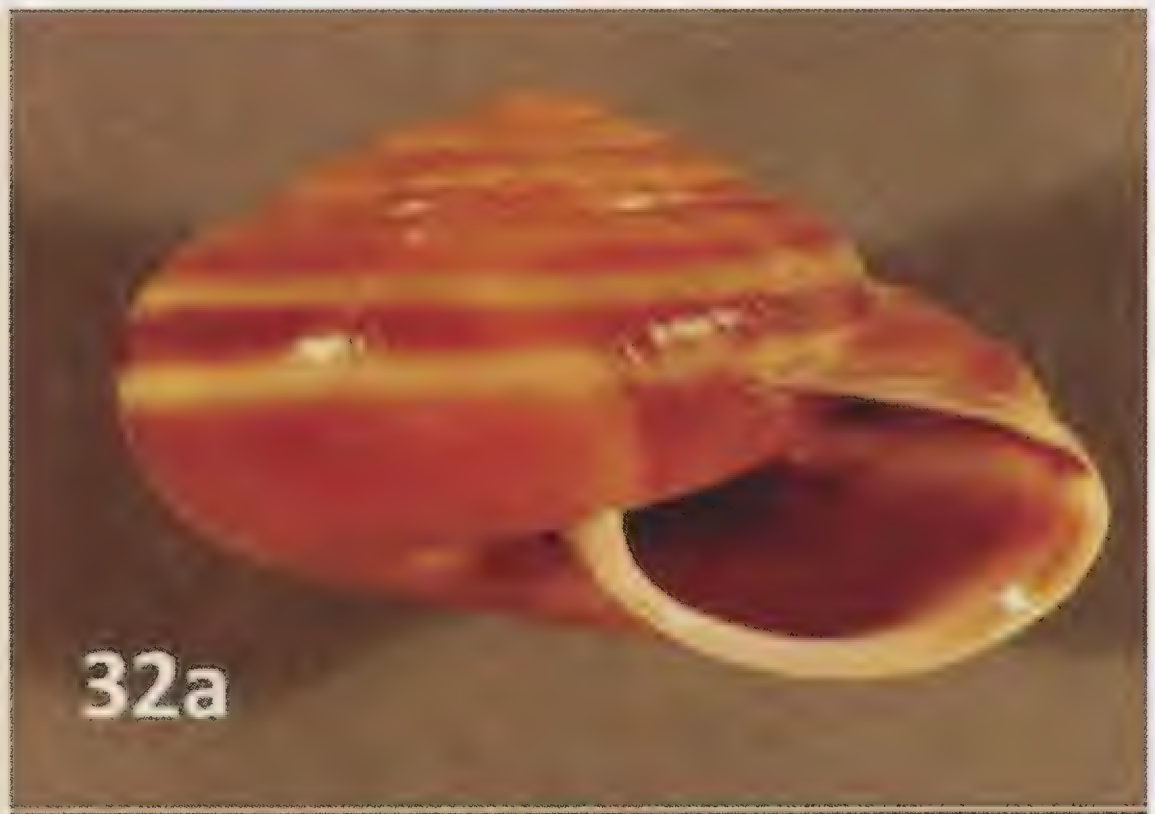
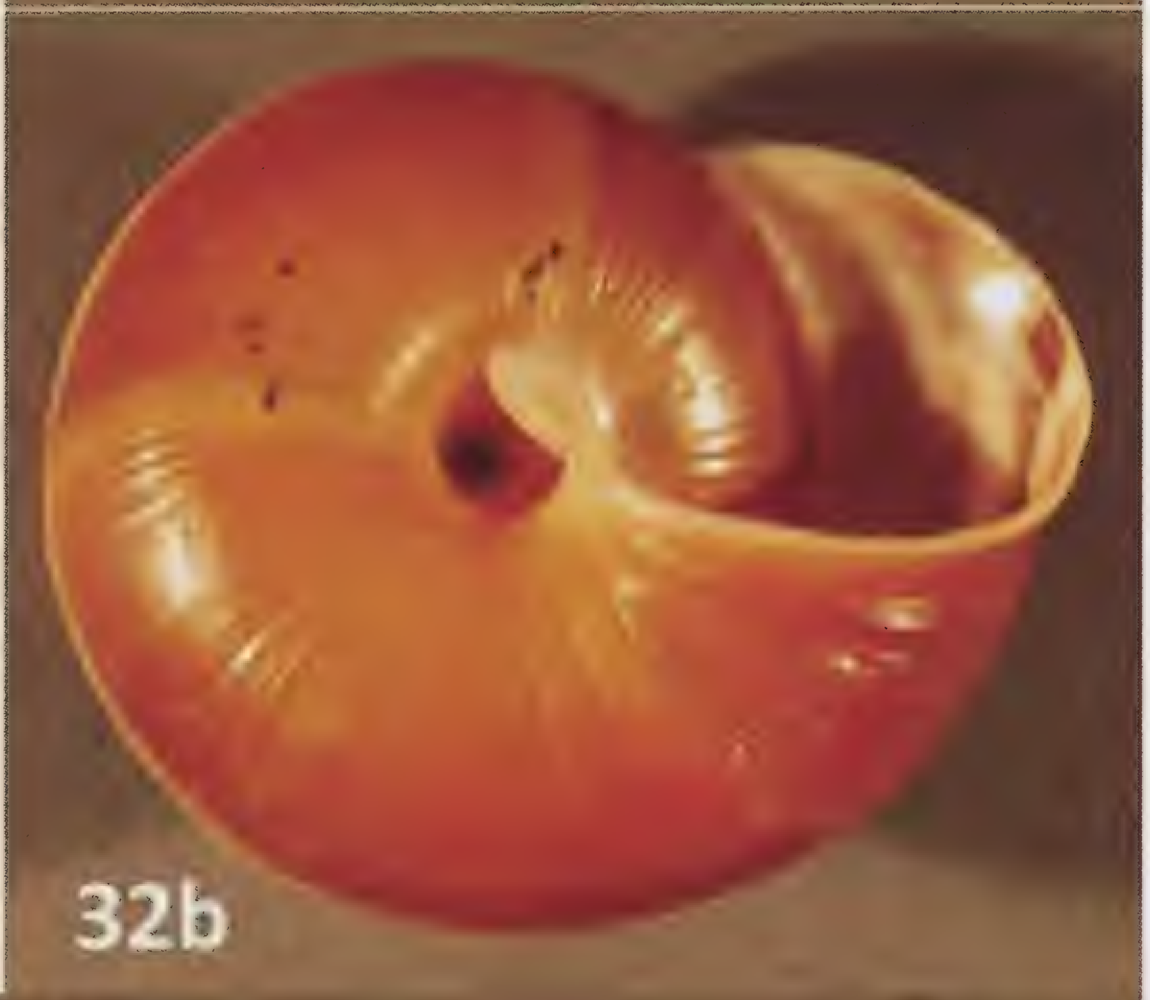

32a


32b

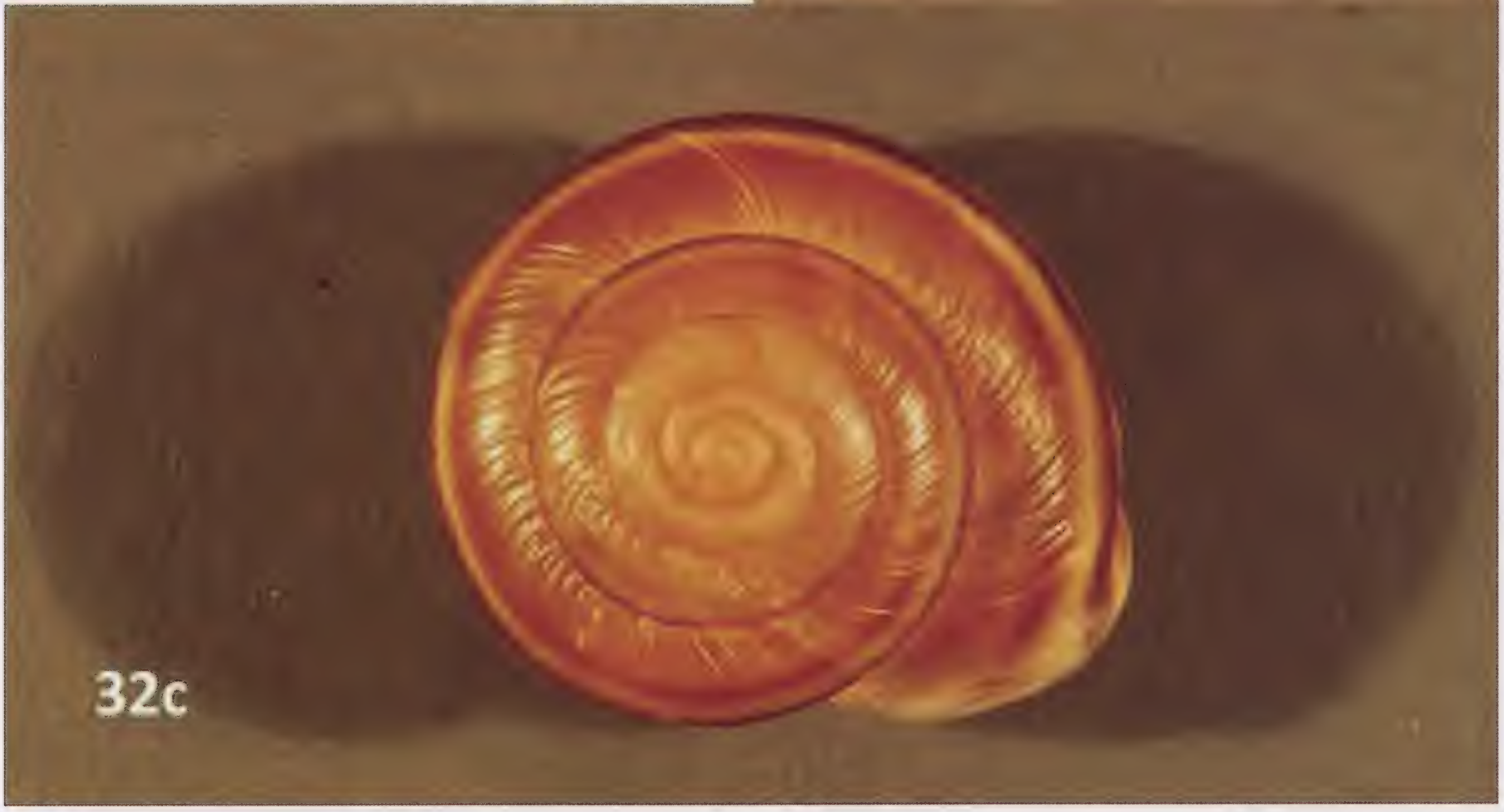
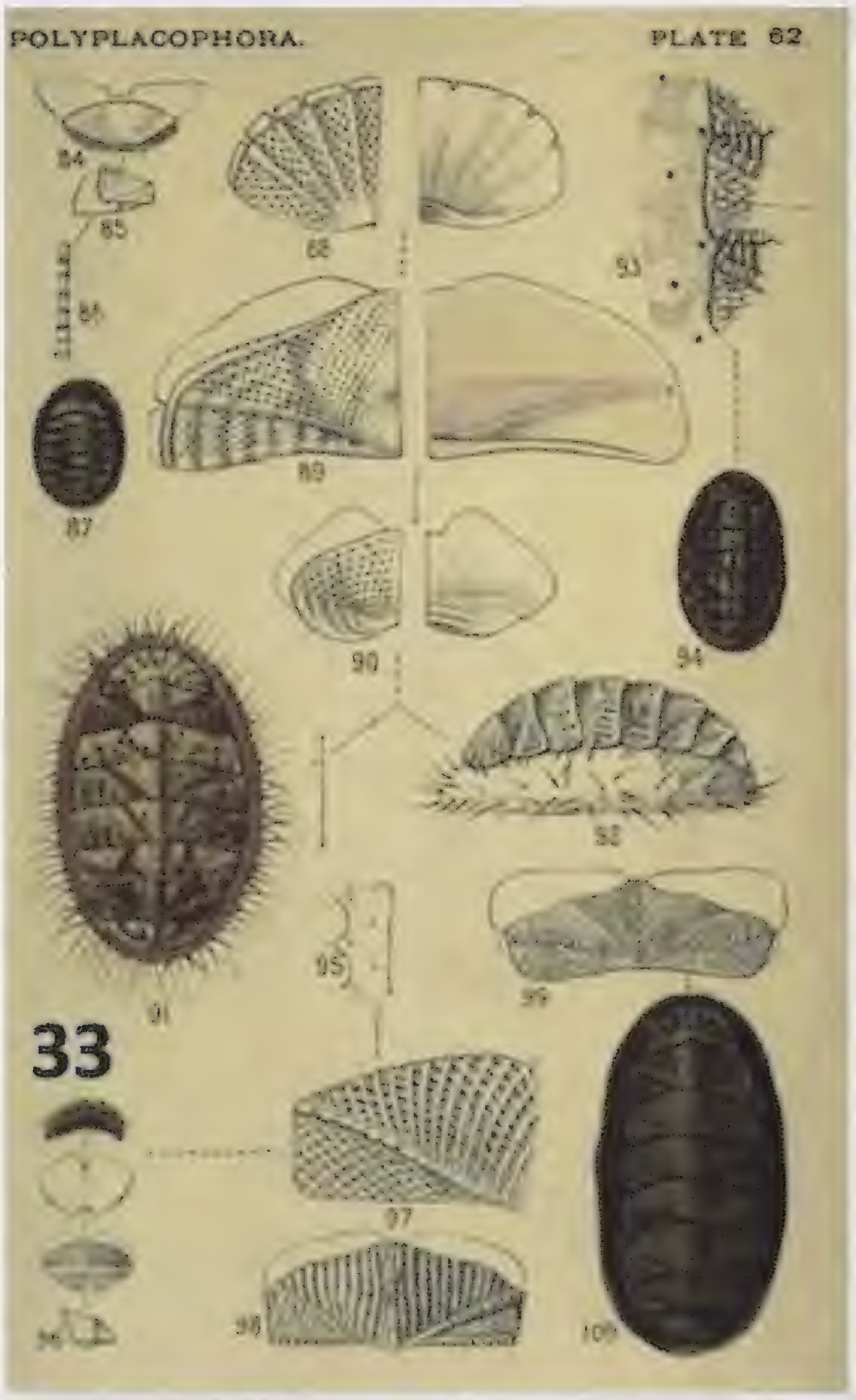

32c

Plate 7. Figure 31. *Monadenia chaceana* Berry, 1940: figures 9-10. **Figure 32a.** *Monadenia chaceana*, apertural view. Collected by Allyn G. Smith, banks of Shasta River, 2-3 miles from mouth, Siskiyou County, CA, 11 September 1934. Photo by Barry Roth. **Figure 32b.** *Monadenia chaceana*, umbilical, basal view. Photo by Barry Roth. **Figure 32c**. *Monadenia chaceana*, dorsal view. Photo by Barry Roth.



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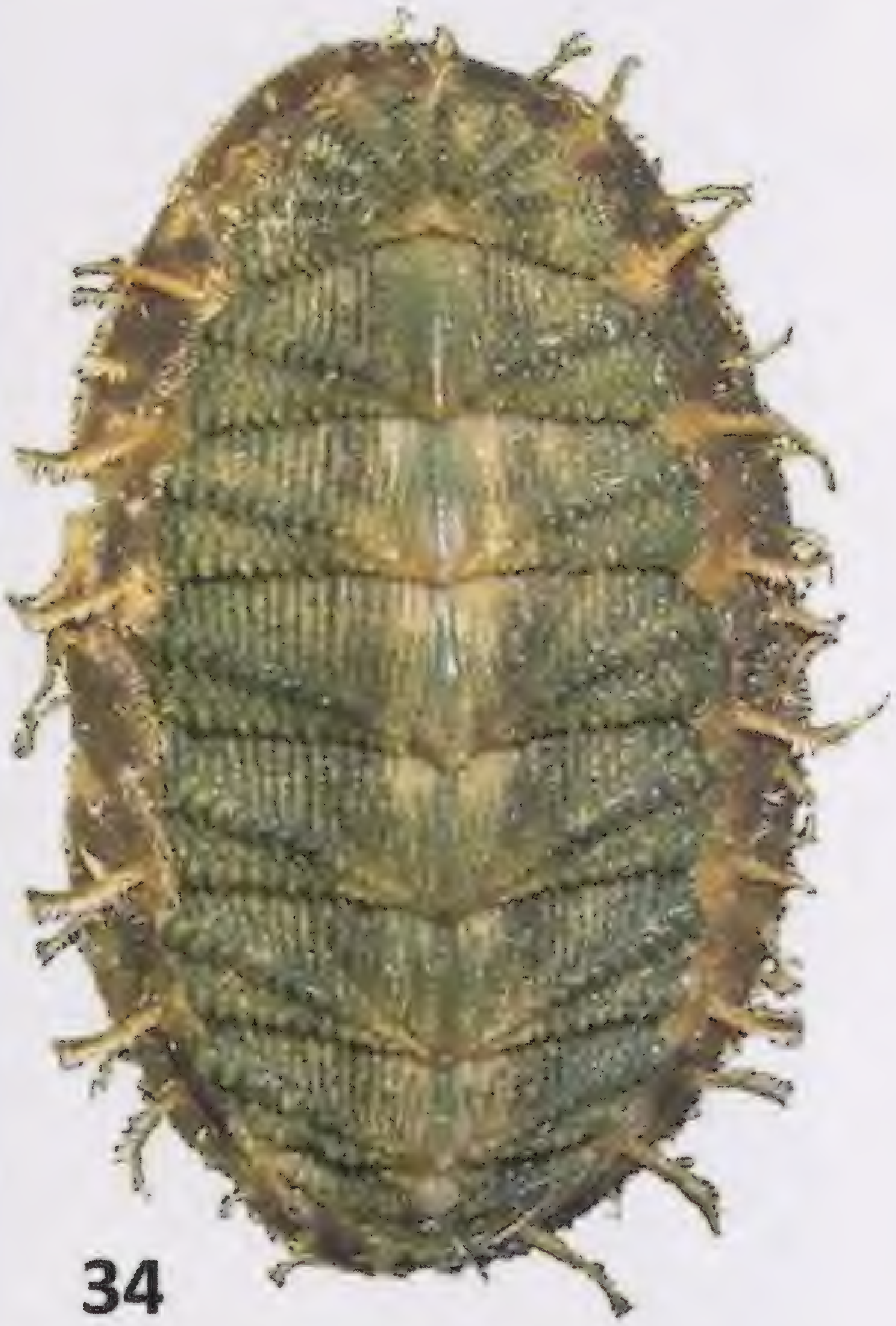

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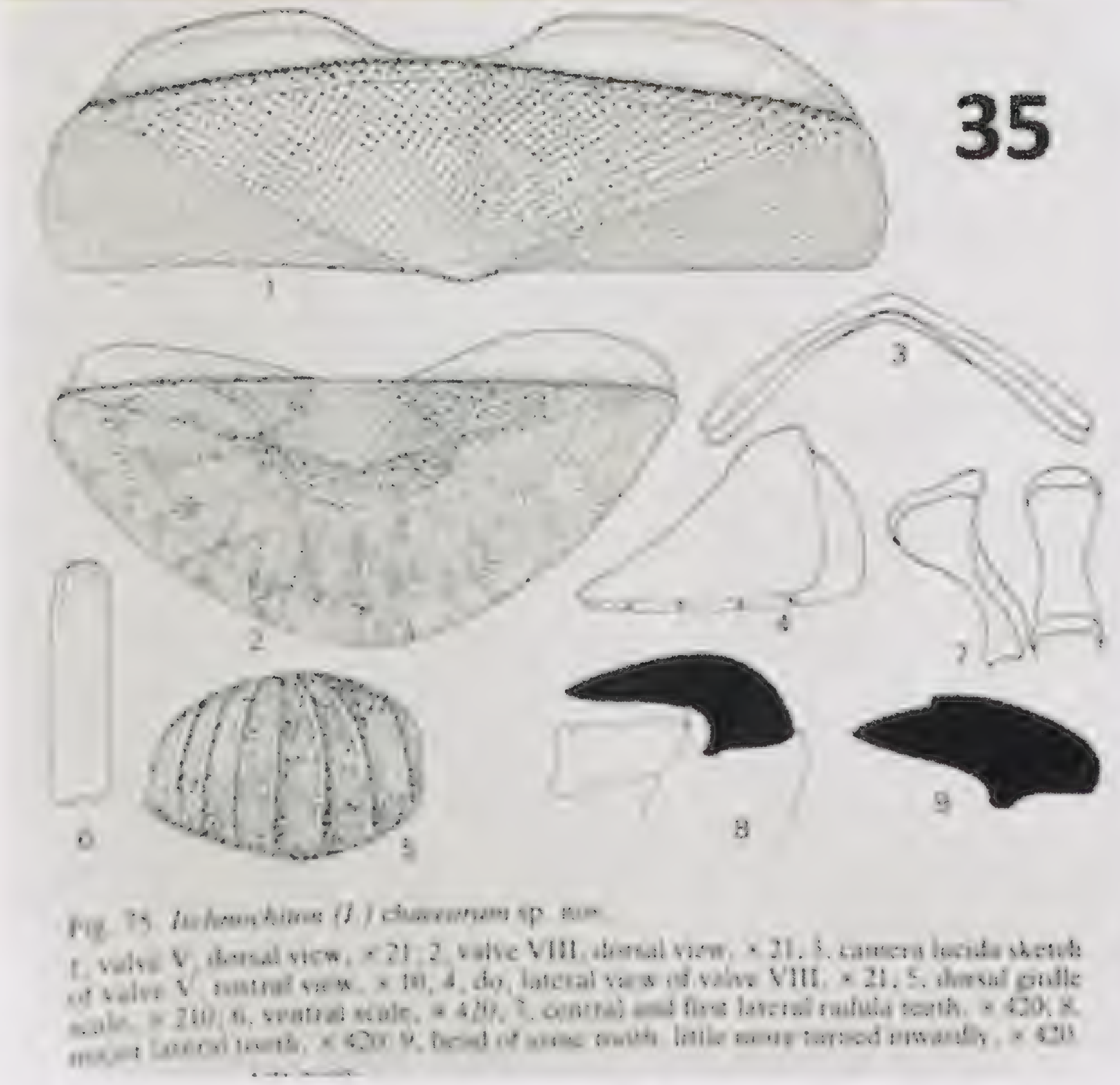

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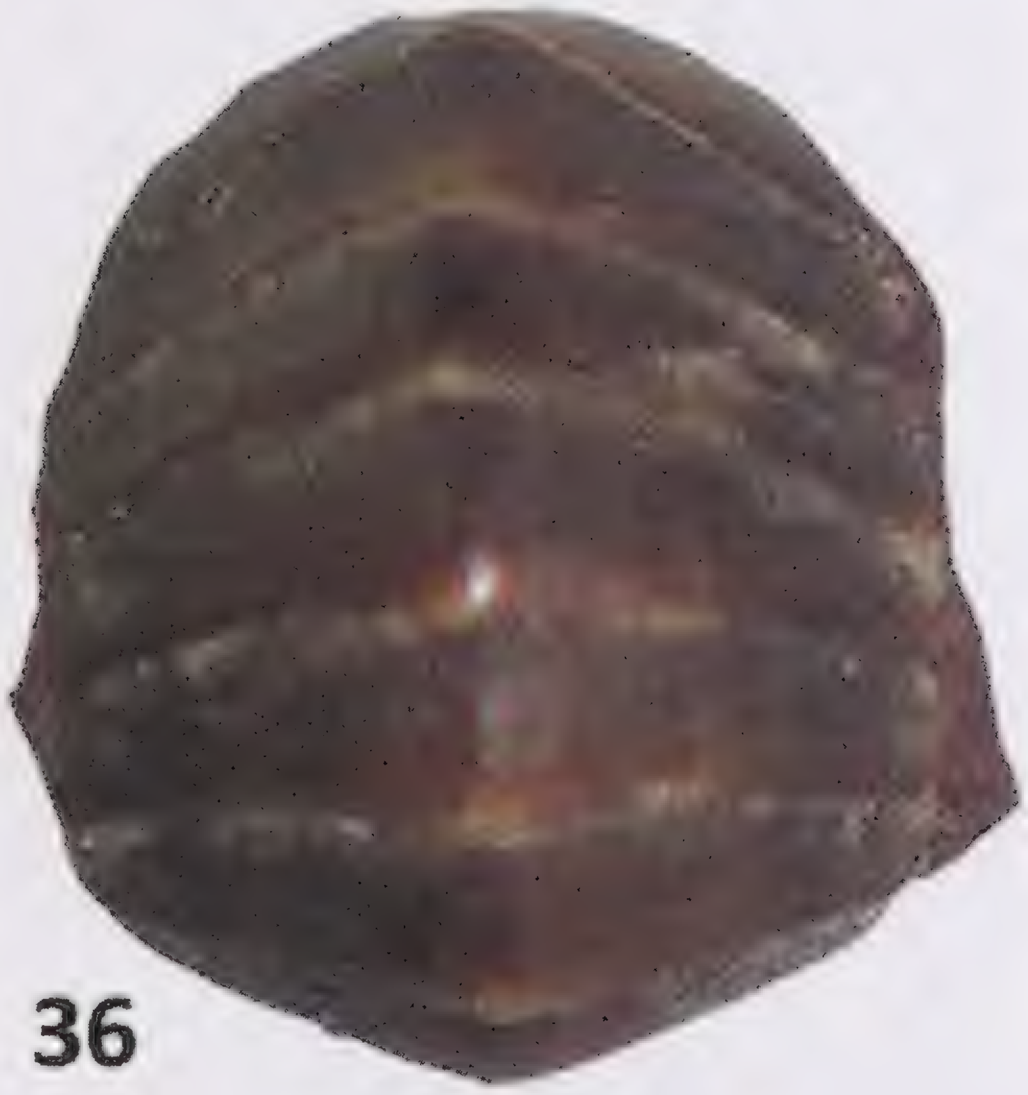

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Plate 8. Figure 33. *Mopalia porifera* Pilsbry, 1893: plate 62, figures 93-94. **Figure 34.** *Mopalia porifera*. Specimen 12 mm long, collected at Pescadero Point, San Mateo County, CA. Photo by Roger N. Clark. **Figure 35.** *Ischnochiton chaceorum* Kaas & Van Belle, 1990: page 168, figure 75. **Figure 36.** *Ischnochiton chaceorum*, 7 mm long specimen. Probably part of the original material collected at Cholla Bay, Puerto Peñasco, Sonora, Mexico, by Emery P. Chace, February 1957. Photo by Roger N. Clark.

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On the invasion of *Naria turdus* (Gastropoda, Cypraeidae) in the Dutch Caribbean, with taxonomic notes on the species

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ABSTRACT In this paper we discuss the dispersal of *Naria turdus* (Lamarck, 1810), a Red Sea and Indian Ocean species, in the Dutch Antilles. The species was first discovered in the Dutch Antilles by the second author in July 2020 in the waters around Aruba, where it currently forms a thriving colony. The first author made a discovery of the species on the nearby island of Curaçao in May 2022 (first record from that island). The status of the many subspecies and forms is discussed and a synonym for the nominal species is designated: *Naria turdus minima* T. Cossignani, 2022 from Oman. Observations on living animals *in situ* are made.

KEY WORDS Gastropoda, Cypraeidae, *Naria turdus*, Caribbean, Aruba, Curaçao, taxonomy

INTRODUCTION

Cypraea turdus [*Naria turdus* (Lamarck, 1810)] originated from the Indian Ocean and Red Sea, and is a common species throughout its range where it occurs. It has invaded the Mediterranean in recent decades (Tunisia) and can be found in Italy since 2005 (Occhipinti-Ambrogi, 2011; personal communications with Indri Nappo). It is a highly invasive species that establishes itself in suitable habitats in new areas. In the Dutch Caribbean, the species was first discovered in July 2020 on Aruba by the second author. (Figure 1) It was also reported from Venezuela (Leo Ros, personal observation), several localities in Puerto Rico (Leo Ros, personal communications with Elizabeth Leon Melendez), Costa Rica, and Bonaire (Leal, 2022). During a five day shell survey by means of diving in Aruban waters at various locations, the species had not yet been found (Berschauer & Ros, 2014).

The species is highly invasive, and can be compared to the recent invasion of the red Lionfish (*Pterois volitans*), a significant invasive species off the East Coast of North America and in the Caribbean, and also in the Mediterranean Sea (Merringtin, 2016). *P. volitans* and (and a second species *P. miles*) are native to subtropical and tropical regions from southern Japan and southern Korea to the east coast of Australia, Indonesia, Micronesia, French Polynesia, and the South Pacific Ocean. These species aggressively prey on small fish and invertebrates, which severely threatens the natural competition of aquatic life in the ocean. They are habitat generalists and can be found around the seaward edge of shallow coral reef.

Just like the Lionfish, *Naria turdus* is a habitat generalist and therefore is very successful. It lives in all kind of habitats: warm to hot shallow water, weedy substrates, rubble, clear or rough water, different degrees of salination, from intertidal to upper sublittoral, an on open sand.

Here we report *Naria turdus* also from a recent find in Curaçao, thus the species has colonized all three of the "ABC-Islands" (Aruba, Bonaire, and Curaçao).

SYSTEMATICS

Family Cypraeidae Rafinesque, 1815
Subfamily Erosariinae Schilder, 1924
Genus *Naria* Gray, 1837

Naria turdus (Lamarck, 1810)

Erosaria turdus distinguenda Schilder, 1927
Erosaria turdus kuwaitensis Heiman, 2014
Erosaria turdus micheloi Chiapponi, 2009
Cypraea turdus pardalina Dunker, 1852
Erosaria turdus singeri Heiman, 2014
Erosaria turdus somaliaensis Heiman, 2014
Cypraea turdus winckworthi F.A. Schilder & M. Schilder, 1938
Cypraea turdus zanzibarica Sullioti, 1911
Cypraea turdus var. *alba* G.B. Sowerby I, 1832
Cypraea turdus var. *pyriformis* G.B. Sowerby II
Naria turdus minima T. Cossignani, 2022
(a random selection of the many synonyms; see MolluscaBase eds. (2022) for more synonyms)

DISCUSSION

The introduced Mediterranean Sea form was described as *Erosaria turdus micheloi* Chiapponi, 2009 (holotype MNHN-IM-2000-21251), originally described from Tunisia, and herein seen as synonymous with the nominal species as there is no significant morphological difference from the nominate species. *Naria turdus minima* T. Cossignani, 2022 from Oman, holotype 25.7 mm, is the most recently described 'subspecies', but it is in fact nothing more than a small sized ordinary *N. turdus* with fewer teeth as the only difference in the description. Oman is one of the centers of distribution for the species. We herewith synonymize *N. turdus minima* T. Cossignani, 2022 with *N. turdus* (Lamarck, 1810).

Naria turdus is a very variable species and we follow Lorenz (2017) in not recognizing the numerous localized populations as either forms or subspecies. Almost all 'subspecies' of *N. turdus* are deemed to be synonyms (Lorenz, 2017). The second author is in favor of a location designation and has used *Naria turdus* f. *gabrielli* to distinguish the Caribbean sites from the other places, but being a recent introduction it will be not genetically different from regular *N. turdus* from elsewhere. Accordingly, as discussed above the form name has no taxonomic value.

Naria turdus (Lamarck, 1810), popular called "the Thrush Cowrie", reaches almost 40 mm and even beyond that, however it is usually around 27-32 mm. Its shell color pattern includes brown spots on the lighter-colored background of the dorsal shell surface, white, yellowish to greenish. The form of the shell is more or less oval and broader and more slender examples are regular finds. Some populations tend to a certain form or color. The base is white and the white color is often seen dorsally as band around the shell. The species name *turdus* means ‘thrush’ and is a genus of birds; apparently there is some resemblance in color pattern. Where it lives it is mostly very common to frequently encountered.

DISCOVERY ON ARUBA AND OBSERVATIONS

The second author first discovered this species in Aruba in July 2020, and consulted Dr. Edward J. Petuch for assistance in identification. Since then many specimens have been collected by the second author and his dive buddy Jordy Wendriks. The part of Aruba where they usually collect is the south/west side; this side of the sea is designated as a maintenance zone for ships, the transport ships, oil tankers etc. Until now, *N. turdus* has been collected in shallow water from three to six meters, in warm water and under algae-rich rocks. The species breeds all year round in Aruba. Usually a female (large) is found close to the eggs and often a few smaller ones (males) can be found in the vicinity. (Figure 2) Where the *N. turdus* are found the team cannot find *N. acicularis.* Another species, *Luria cinerea*, eats the yellow sponges, so don't have to share their food with the newcomer. Below six meters they find empty *N. turdus* buried around the octopus middens; after ten meters depth no *N. turdus* but only the *N. acicularis.*

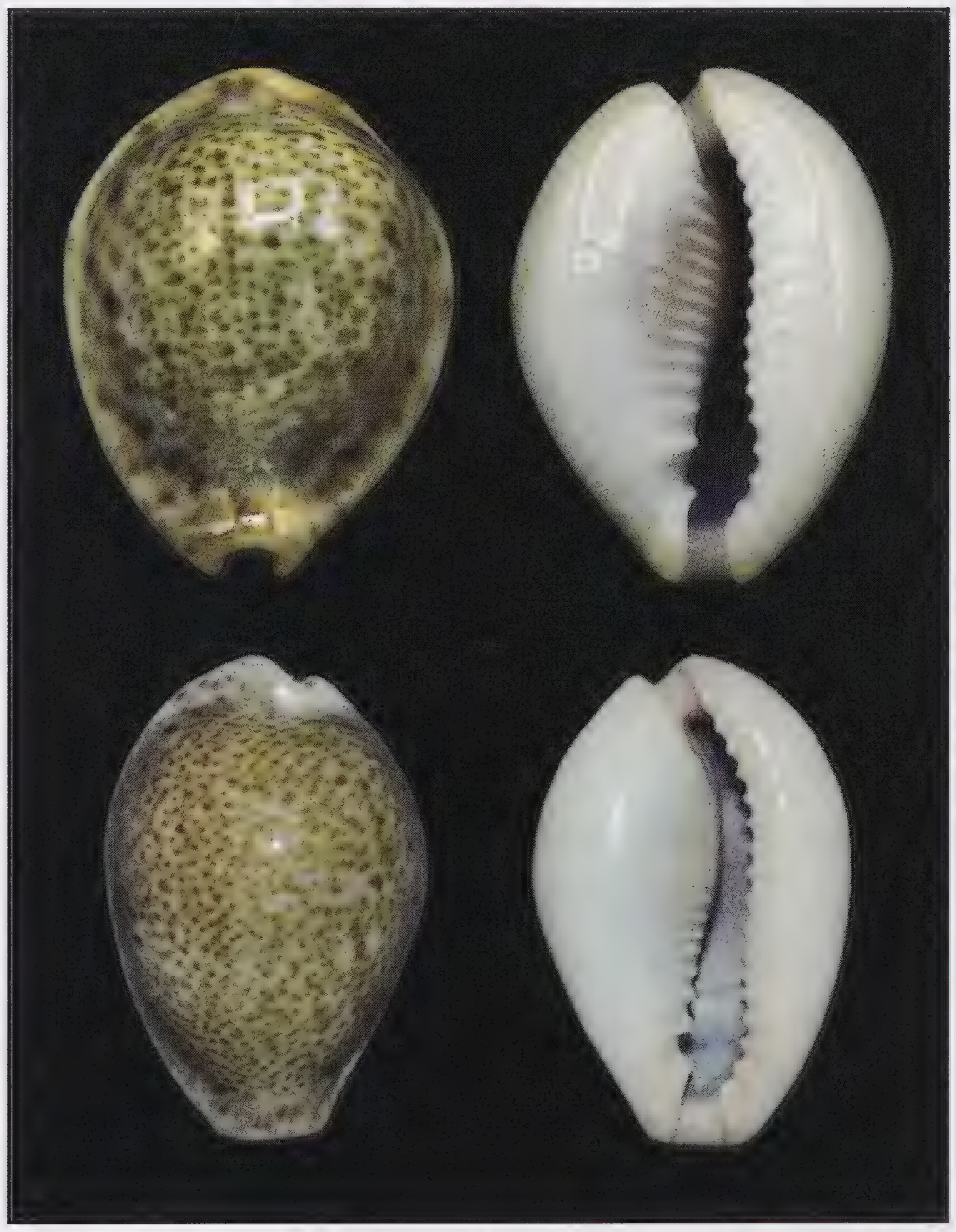

Figure 1. *Naria turdus* from Aruba. Top specimen = 34.65 mm in length. Bottom specimen = 34.45 mm in length.

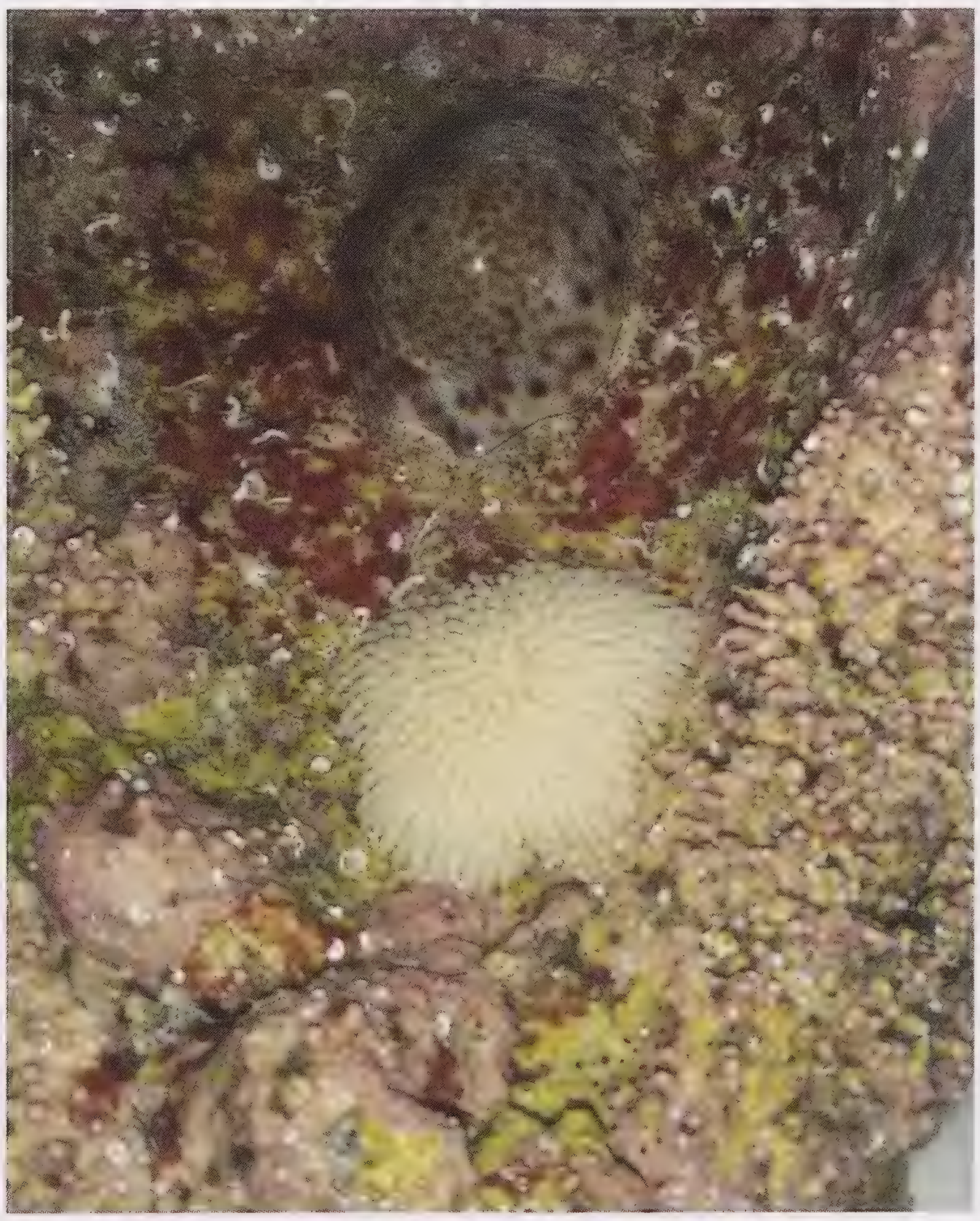

Figure 2. Live *Naria turdus* specimen on rock adjacent to its egg mass.

DISCOVERY ON CURAÇAO

The first author was on wedding holiday on the beautiful island of Curaçao, Dutch Antilles, during the second half of May 2022. A regular visited beach was the small beach locally known as the Piscadera Bay or Pirate Bay or Pirate Bar, Piscadera, west of and part of the capital Willemstad. During the second stone turning in shallow water on the calm east side of the small bay, I was surprised to find a *Naria turdus* at the bottom of an overgrown rock. The depth was at arm's length at low tide. It was attached near an oval of about 3 x 2 cm of large whitish eggs which probably belonged to the specific specimen. Only the adult specimen was taken and the stone was returned to its original position, giving the eggs a chance to hatch. As far as we know, this is the first record for Curaçao.

ORIGIN AND IMPLICATIONS

Both *N. turdus* and the Lionfish are new (strongly invasive) elements in the Caribbean Sea. How did they get there? We don't know the exact cause of the species' recent introduction to the Caribbean. The most likely mode of propagation is through veligers (and very young fish) traveling in the ballast water of ships. If the ships arrive fairly empty, the ballast tanks are full of seawater taken from where they sailed from. Once at the harbors of the islands, taking goods on the ships, the ballast water is pumped out and the water mingles with the local seawater. But *N. turdus* can also enter the Caribbean through its veliger larvae that were in the hold water of one of the oil tankers that went to the refineries in Aruba and Curaçao. On Aruba, there are always a few ships off the coast. During the stay, the ships discharge their ballast water and take in fresh seawater, which is also used for the toilets, etc. For example, the *N. turdus* most likely came from a population of the Persian Gulf or possibly the Gulf of Aden if it is related to the oil tankers. Tracing the origin of the veligers through molecular research on the established origin populations could provide an answer.

When the condition of the local seawater is more or less the same as from the place of origin, the conditions are favorable for survival. Habitat generalists like *N. turdus* and the Lionfish have even a better chance to survive the trip to the other side of the world.

Species introductions and invasions usually come at the expense of native species in the invaded areas, often causing ecological disaster such as the Lionfish. A potential cause of disaster is the lack of predators of the invasive species; another cause is the high production of the invasive species occupying the niches of other species. In the case of *N. turdus*, the only cowrie possibly affected by the invasive species in the Netherlands Antilles would be *Naria acicularis* (Gmelin, 1791). *Naria turdus* is found in very shallow water and *N. acicularis* generally lives deeper, reducing the risk of the latter being completely displaced by *N. turdus*. Nevertheless, *N. turdus* has ecologically displaced the shallower water populations of *N. acicularis* in the areas it has become established.

CONCLUSIONS

Naria turdus is found in very shallow water in the Dutch Antilles and was first discovered by the second author in 2020 in the waters surrounding Aruba. With Curaçao's new record, it is clear that the species lives around all three of the “ABC islands” (Aruba, Bonaire, and Curaçao). With the other records from the Caribbean, it’s only a matter of time before the species will conquer the entire vast Caribbean region.

Naria acicularis will be partly displaced by this invasive species. We hope the damage to *N. acicularis* populations will be minimal.

ACKNOWLEGEMENTS

We thank Indri Nappo from Italy, Dr. Edward J. Petuch from Florida, USA, and Henk Dekker, Winkel, the Netherlands, for additional information on the invasion of *N. turdus* and help with literature.

LITERATURE CITED

Berschauer, D.P. & Ros, L.G. 2014. A Survey of Mollusks Collected in Aruba. The Festivus 45(3): 54-62.

Chiapponi, M. 2009. A lessepsian subspecies of *Erosaria turdus* (Lamarck, 1810) (Mollusca: Gastropoda: Cypraeidae). Acta Conchyliorum 10:95-101.

Cossignani, T. 2022. Nuovo *Naria* Gray, 1837 dall’Oman. Nostra Mondiale Cupra maritima 115:39.

Merrington, A. 2016. "Lionfish invading the Mediterranean Sea". Plymouth University.

Lamarck, J.-B. M. de. 1810. Sur la détermination des espèces parmi les animaux sans vertèbres, et particulièrement parmi les Mollusques testacés. Annales du Muséum d'Histoire Naturelle. 15: 20-40; [Suite des espèces du genre Cône] 263-286, 422-454; [Suite du genre Porcelaine] 16: 89-114.

Lorenz, F. 2017. Cowries. A guide to the gastropod family Cypraeidae. Volume 1, Biology and systematics. Harxheim: ConchBooks. 644 pp.

Occhipinti-Ambrogi, A., A. Marchini, G. Cantone, A. Castelli, C. Chimenz, M. Cormaci, C. Froglia, G. Furnari, M.C. Gambi, G. Giaccone, A. Giangrande, C. Gravili, F. Mastrototaro, C. Mazziotti, L. Orsi-Relini, and S. Piraino. 2010. Alien species along the Italian coasts: an overview. Biological Invasions 13(1):215-237.

Internet references:

Leal, José H. (2022, May 6) "An Invasive Mollusk Makes Headway in the Caribbean: Where Next?" Bailey-Matthews National Shell Museum Curator's Blog. Retrieved May 27, 2022, from https://www.shellmuseum.org/post/an-invasive-mollusk-makes-headway-in-the-caribbean-where-next

MolluscaBase eds. (2022). MolluscaBase. *Naria turdus* (Lamarck, 1810). Accessed through: World Register of Marine Species at: https://www.marinespecies.org/aphia.php?p=taxdetails&id=1079151 on 2022-06-01

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William Jon Ritter (1945-2022)

Roger N. Clark

It is with great sadness that I report the passing of a good friend and fellow shell collector, Mr. William Jon ("Will") Ritter. Will was born in Astoria, Oregon in 1945. After receiving a degree in Geology from Oregon State University, his love for the outdoors took him to Alaska where he enjoyed a career in commercial fisheries, until a burst appendix (while at sea) forced him to retire back in his beloved Astoria. In his retirement, Will "worked" the local trawler fleet for mollusks and amassed a fantastic collection of Pacific Northwest shells. Will also enjoyed exchanging shells and information with other collectors and researchers around the world, and was very generous in sharing his extensive knowledge. Will was a kind, generous, intelligent man, who loved dogs and shell collecting. Will passed away on May 18, 2022, in Astoria. He will be greatly missed! A Pacific Northwest shell was named in his honor in this issue.

Albert Deynzer (1935- 2022)

David P. Berschauer

Photo by Richard Goldberg
Circa 1980

Albert "Al" Deynzer was more than just a world class shell dealer, having started in the 1960s while still a Major in the U.S. Air Force. To those who knew him Al was an engaging, fun loving man with unbounded enthusiasm for life. Al was soft spoken yet outgoing, extremely knowledgeable yet humble. Al and his wife Beverly (and later their son Neal) were renowned divers and naturalists, with contacts throughout the eastern seaboard, the Gulf of Mexico, and throughout the Caribbean. In 1978 Al and Beverly started Show Case Shells in Sanibel, Florida, and earned a reputation as top notch shell dealers. Al and Beverly turned the shell shop over to their son Neal after over four decades running Show Case Shells, and moved to Colorado. Al was a savvy business man and gave his competitors in the shell business a run for their money offering the very best shells at extremely fair prices. He also was generous and supported young budding scientists by donating specimens of rare and exotic shells for their studies. As a result many species of mollusks were named after Al or Beverly, a few of which include: *Americoliva deynzerae* (Petuch & Sargent, 1986), *Cariboconus deynzerorum* Petuch, 1995, *Favarita deynzeri* Houart, 1998, *Merica deynzeri* Petit & Harasewych, 2000, *Murexiella deynzerorum* Petuch, 2013, and *Dentifusus deynzeri* Vermeij & Rosenberg, 2013. Al Deynzer passed away on July 27, 2022, in Colorado and leaves behind his wife Beverly, his son Neal, and many friends. The shell world is a poorer place without Al Deynzer.

E. adansonianus adansonianus (Crosse & Fischer, 1861),Bahamas, 106.1 mm. *B. poppei* (Anseeuw, 2003), Tonga Islands, 58.8 mm. *P. amabilis* f. *maureri* Harasewych & Askew, 1993, USA, 42 mm. *B. tangaroana* (Bouchet & Métivier, 1982), New Zealand, 55.9 mm. *P. quoyanus* (Fischer & Bernardi, 1856), Curaçao, 50.7 mm. *B. philpoppei* Poppe, Anseeuw & Goto, 2006, Philippines, 65.1 mm. *B. charlestonensis* Askew, 1987, Martinique, 77.3 mm. *B. midas* (Bayer, 1965), Bahamas, 82.7 mm.

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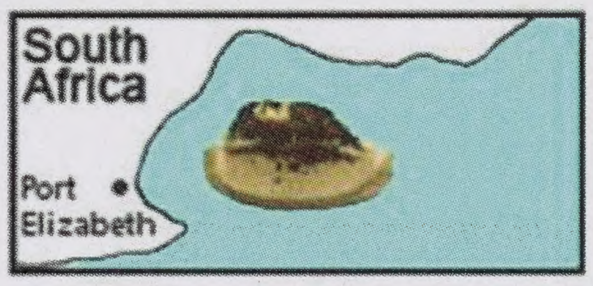

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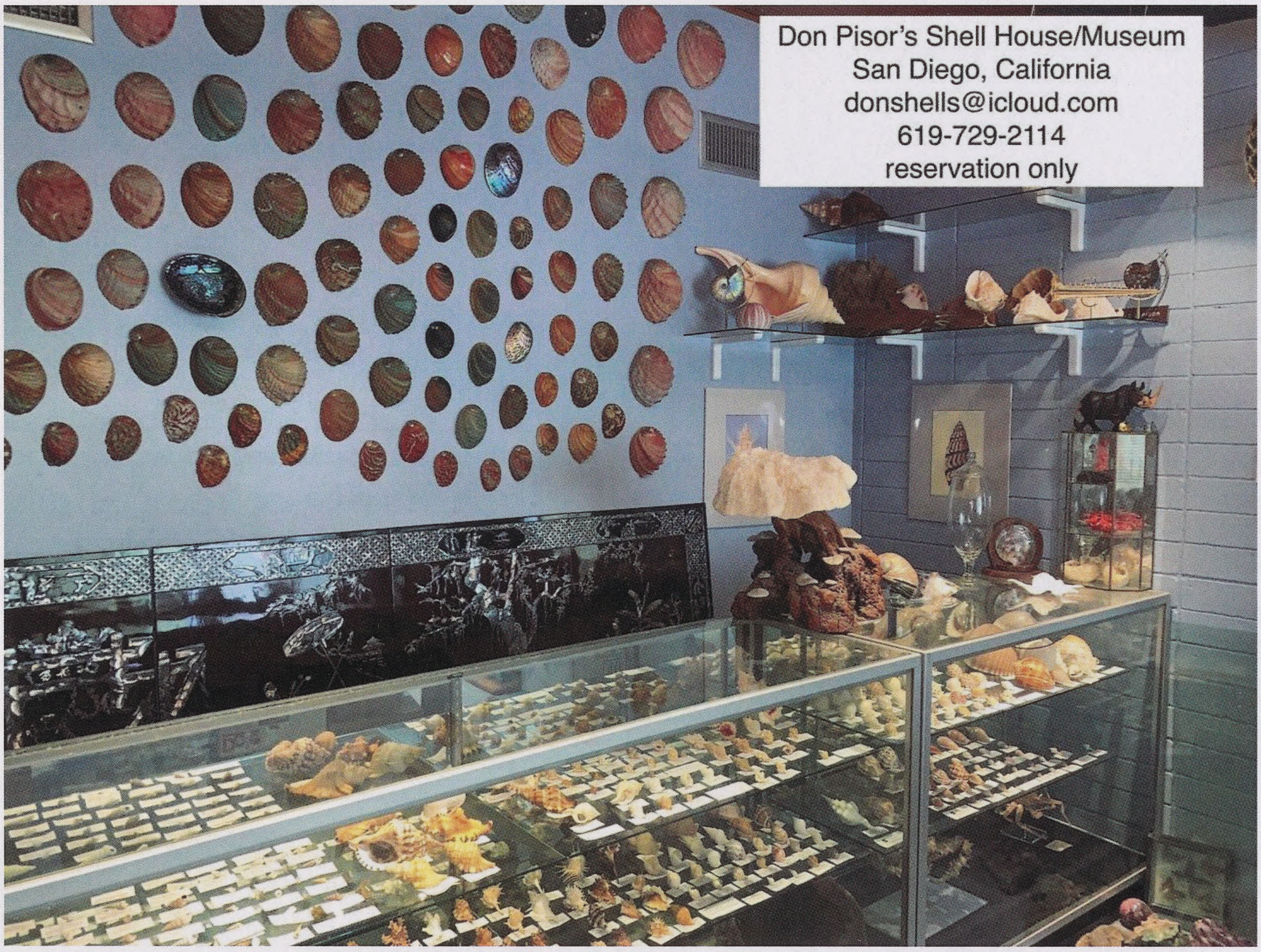

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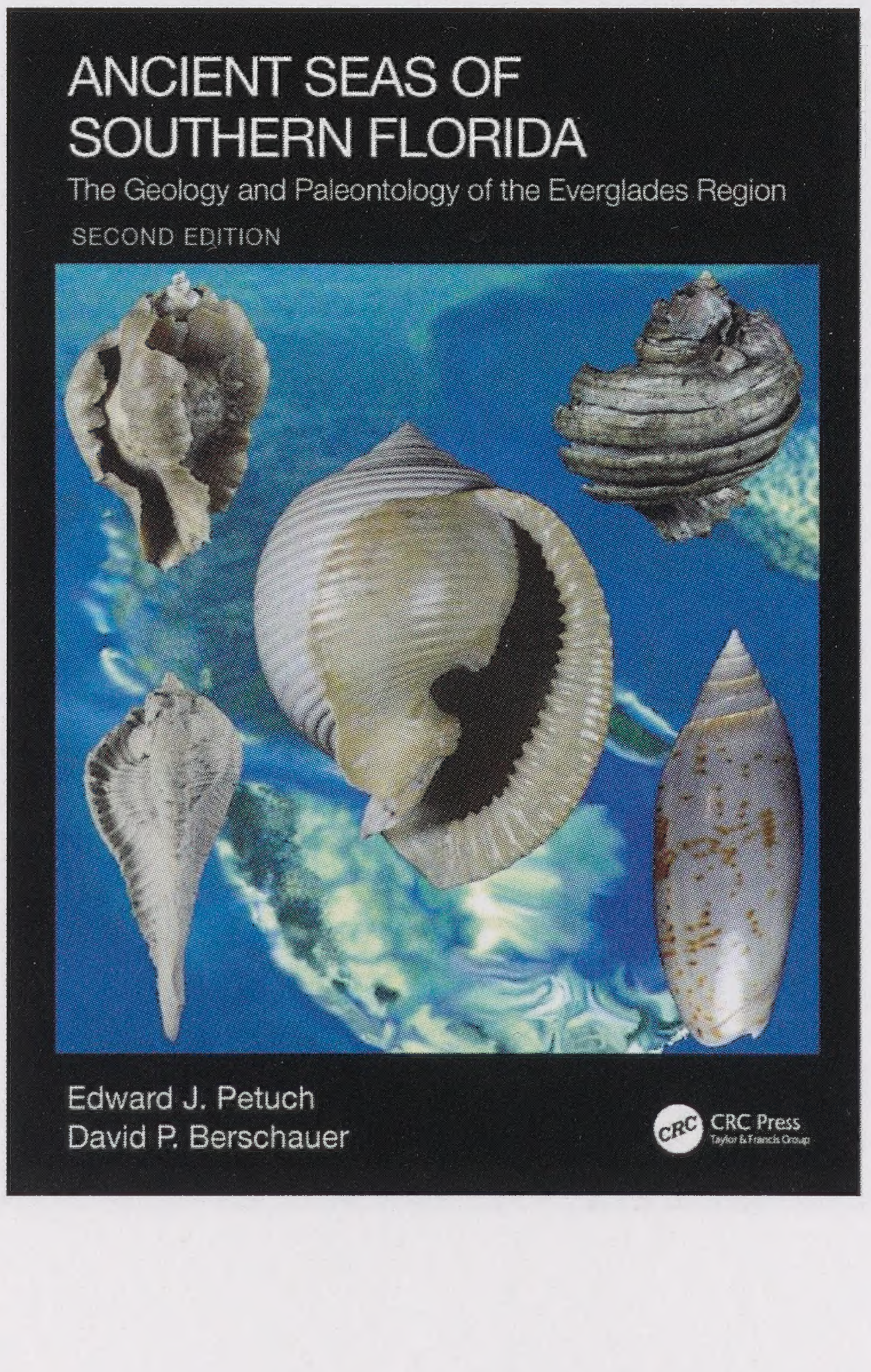

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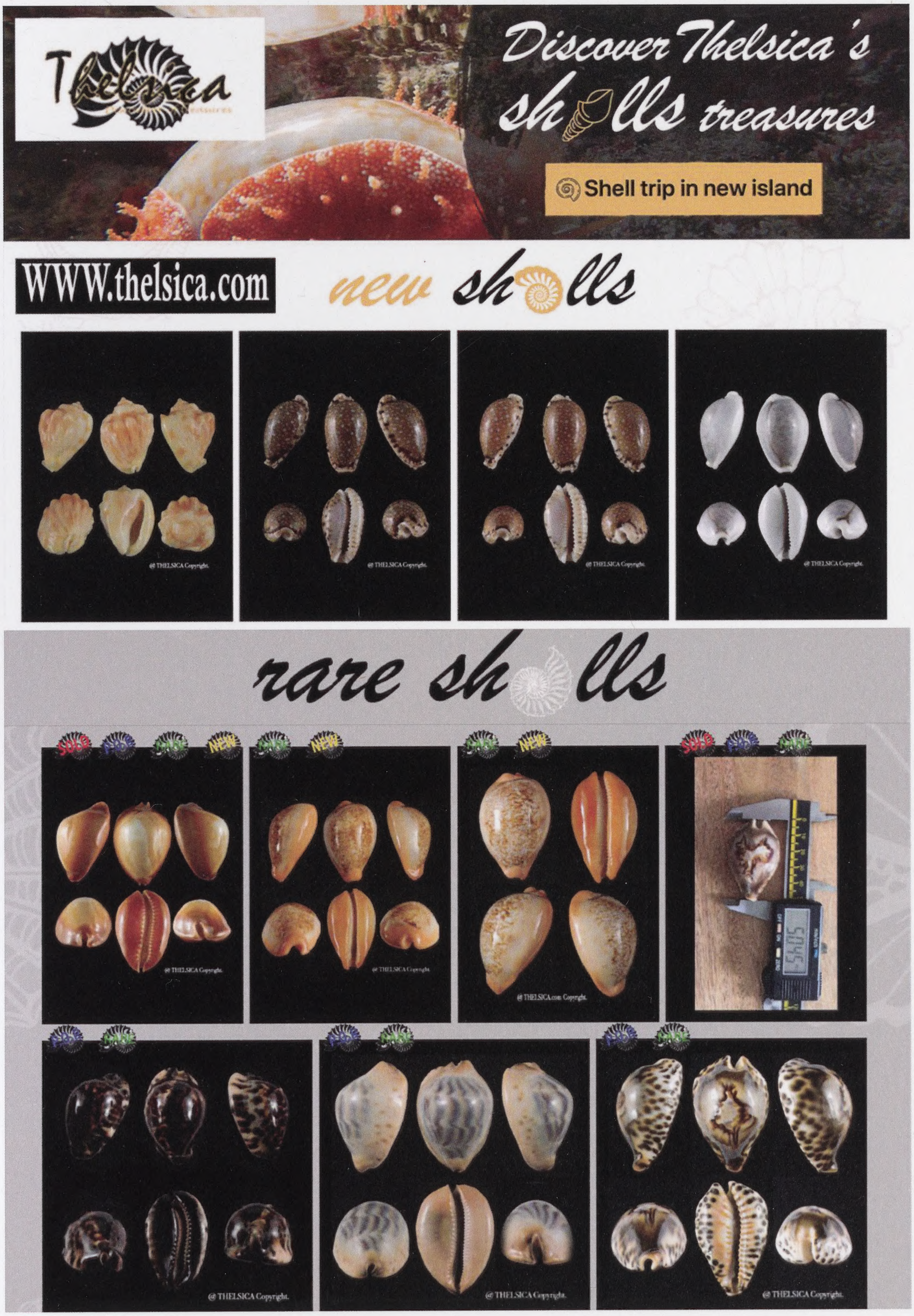

Back cover: A putative hybrid between *Harpago chiragra* (Linné, 1758) and *Solidistrombus latissimus* (Linnaeus, 1758), 14.5 cm (collection of Khang Ocean). (Photo courtesy of Stephen Maxwell) (Cover artistic credit: Rex Stilwill).

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